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ABSTRACT

Presented in these 13 teacher's guides for grades K-12 are lesson plans and ideas for integrating science and environmental education. Each lesson originates with a fundamental concept pertaining to the environment and states, in addition, its discipline area, subject area, and problem orientation. Following this, behavioral objectives and suggested learning experiences are outlined. Behavioral objectives include cognitive and affective objectives and skills to be learned, while learning experiences list student-centered in class activities and outside resource and community activities. Space is provided for teachers to note resource and reference materials--publications, audio-visual aids, and community resources. The guides are supplementary in nature and the lessons or episodes are designed to be placed in existing course content at appropriate times. This work was prepared under an ESEA Title III contract. (BL)

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONM

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A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE K

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
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INSTRUCTION - CURRICULUM - ENVIRONMENT

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AM FOR ENVIRONMENTAL EDUCATION

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III E.S.E.A.

SA's 3-8-9

54301

Robert Warpinski, Director
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George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is ready. Of over a hundred teachers, year long meetings, a summer workshop, university ecologists, this guide means realistic, developed aid for you. Please note which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are designed--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your students to adapt, adopt, or use. By design, the range of suggestions is wide; experimentation and usage are even wider. Many episodes are self-contained; others can be changed in part or developed more keenly over a few weeks; possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning experiences. The reasons are simple. No guide has all the answers and no curriculum unless viewed in the context of your classroom situation. Thus, before giving it a triple reading, check over the resources listed, make mental notes, prime your students, and seek help. The Project personnel and teachers' knowledge page stand ready to aid your efforts. Feel free to ask.
4. The Project Resource Materials Center serves all CESA 3, 8, and 9 areas. We will send available materials pre-paid. Call for any help or visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library for new materials. Please offer suggestions, comments, or advice--at any time; service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch ideas or suggestions on the episode pages or use the attached evaluation form. Submitted in late May next year and will be used in our revisions. We seek all reactions and suggestions--negative and positive. Please note that suggestions in the episodes may refer to specific, local community resources or cases; individual school districts and teachers will have to adopt local substitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--survival--your role in Creation's beauty and complexity--often noted as the work of a genius and human energy to save. A year's work by a hundred of your fellow ecologists. Without you, their work will crumble, and so might we all--let us live to think, feel, and act in harmony with our world.

Editorial

1. Cognitive means a measurable mental skill, ability, or process based on
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels a cognitive process)
4. EPA - Environmental Problem Area

PREFACE

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Complementary in nature and the episodes are designed--at appropriate instances--existing, logical course content.

Each episode offers suggestions. Since you know your students best, you decide what to use. By design, the range of suggestions is wide; your chances for experience are even wider. Many episodes are self-contained, others open-ended, still others designed in part or developed more keenly over a few weeks. These built-in episodes allow you to explore.

you try the episodes and suggested learning experiences but please pre-plan are simple. No guide has all the answers and no curriculum will work without the context of your classroom situation. Thus, before trying an episode, read, reread, and check over the resources listed, make mental and actual notes, discuss with colleagues, and seek help. The Project personnel and teachers listed on the acknowledgment stand ready to aid your efforts. Feel free to ask their help in pre-planning. The Resource Materials Center serves all CESA 3, 8, and 9 area schools--public and private--and sends available materials pre-paid. Call for any help, materials, or to 4338.

Project ICE Bibliography in your school library for available Resource Materials. Please offer suggestions, comments, or advice--at any time--so that this guide can be improved. Let's help each other.

With the guide by reacting to it with scratch ideas, notes, and extended discussions. Use the episode pages or use the attached evaluation format, which will be collected next year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed may refer to specific, local community resources or conditions. In such cases, school districts and teachers will have to adopt local or available substitutes. A list of terms pertinent to the episodes is below.

Other experts have simplified the issue--survival--yours, mine, our students, and complexity--often noted as the work of a genius--will take our genius to save. A year's work by a hundred of your fellow teachers is a saving grace. Your work will crumble, and so might we all--literally. Instead, think, feel, and act in harmony with our world.

Editorial Board

is a measurable mental skill, ability, or process based on factual data. It is not based on student attitudes, values, and feelings.

Acceptable Performance Will Include (labels a cognitive or mental performance.)

Mental Problem Area

ACKNOWLEDGEMENTS: The following teachers and consultants participated of the Supplementary Environmental Education Guide:

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 Marie Below, Clintonville
 William Bohne, Kimberly
 Bob Church, Little Chute
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 Ronald Hammond, Hortonville
 Jerome Hennes, Little Chute
 Barbara Huth, Menasha
 Darrell Johnson, Hortonville
 Bernadyne King, Neenah
 Harold Lindhorst, St. Martin (L)
 John Little, Winneconne
 Gordon Rohloff, Oshkosh
 William Schaff, St. Joseph
 Doris Stehr, Mt. Calvary (L)
 Carolyn Shills, New London
 Sister Dorothy, Xavier
 Clarence Trentlage, Freedom
 Mike Hawkins, Xavier
 Beth Hawkins, Xavier
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 Jim Maki
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ette David West, Lawrence U.

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Dennis Bryan, UWGB

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cesses (1)

Discipline Area Sci Scien
 Subject Scien
 Problem Orientation Energy

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p>Cognitive: To recognize the sun & to tell 3 ways in which the sun makes me change clothes. To compare results when plants have sun or are without sun.</p> <p>Affective: Children will accept that the sun is essential for all life on earth.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Paper doll figures. Dress with different clothes on rainy, sunny, and cold days. What different activities do you do when weather changes. 2. Weather calendar: keep track of the weather for the month. Enumerate days of similar weather.
<p><u>Skills to be Learned</u></p> <p>Decision as to importance of sun to plants through experiments.</p> <p>Planting and observing growth</p> <p>Keeping records of weather changes.</p> <p>Measuring shadows.</p>	<ol style="list-style-type: none"> 3. Demonstration: Two plants and one box are needed. Place in sunlight. Cover one with a box, leave other in direct sunlight. 4. Place plant in window. Turn it and observe how its leaves will turn towards the sunlight. 5. Chart: Seeds, and Plants They Become. Save package from seeds and use outer pictures. Also-plant seed in glass jar. On outside of jar, tape seed samples so child sees seed and plant. 6. Booklet: Fruits and Vegetables. Indicate part of plant we consume. <p>(cont.)</p>

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is converted through

photosynthesis into a form all

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Discipline Area Science

Subject Science

Problem Orientation Energy Use Grade K-1

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Paper doll figures. Dress with different clothes on rainy, sunny, and cold days. What different activities do you do when weather changes.
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 6. Booklet: Fruits and Vegetables. Indicate part of plant we consume.

- II. Outside Resource and Community Activities
1. Go outside 3 times a day and watch your shadow. Trace it and watch it move.
 2. If possible, gain access to a small plot of land and plant a garden in spring.

(cont.)

Resource and Reference Materials Publications:

Books:

- Science for Work and Play,
Herman & Nina Schneider.
Concepts in Science, Brandwein,
Cooper, Blackwood, & Hone.

Audio-Visual:

Films:

- Shadows on Our Turning Earth,
Associates of California.
Food from the Sun, color, 10 min.
(EBF) - BAVI
Planting Our Garden, color
11 min., Coronet, BAVI

Filmstrips:

- Sun Up (Weston Woods Story
Films)
The Sun's Family
Susan and Peter Dress to Match
the Weather
Spring Is Here
Winter Is Here
Summer Is Here
Autumn Is Here

Community:

- Trip: Greenhouse

Continued and Additional Suggested Learning

I. (cont.)

7. Trees have different uses: evergreens, mas, shade, firewood, produce fruits and beautification, animal homes, lumber.
8. Compare a garden, greenhouse, field.
9. Place hand in direct sunlight and another in shade. Compare difference in temperature.
10. Sun's rays create change. Place color in sunlight. (Will fade.) What happens when in sun. (Sunburn.) Therefore, when sun plant leaves a change takes place. (Photosynthesis)

Materials	Continued and Additional Suggested Learning Experiences
<p>in,</p> <p>h,</p> <p>0 min.</p> <p>ch</p>	<p>I. (cont.)</p> <ol style="list-style-type: none"> 7. Trees have different uses: evergreens for Christmas, shade, firewood, produce fruits and nuts, beautification, animal homes, lumber. 8. Compare a garden, greenhouse, field. 9. Place hand in direct sunlight and another in shade. Compare difference in temperature. 10. Sun's rays create change. Place colored paper in sunlight. (Will fade.) What happens when you're out in sun. (Sunburn.) Therefore, when sun shines on plant leaves a change takes place. (Photosynthesis.)

C 2. All living organisms interact among
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 N themselves and their environment,
 C
 E forming an intricate unit called an
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 T ecosystem.

Discipline Area Sci.

Subject Sci.

Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Child will circle names of living things when given a list of living & non-living things. He will write a story about taking care of his pet or how any other animal survives. He will draw a picture of the things he enjoys on a nature walk.

Affective: There is an awakening of his senses through participation in all phases of his life.

Skills to be Learned

Distinguish between living & non-living things

Cooperation with other children when planning an environmental outing

Relate to class how he cares for his own pet

Write stories about how we depend on nature

I. Student-Centered in class activity

A. Class activity

1. Draw a human body emphasizing five senses: ears, eyes, nose, mouth, hands & feet. Children think of ways in which they have used their five senses & list them on a chart: I Hear - I Taste - I Smell - I Feel - I See.
2. Blindfold game. Have familiar objects for the child to guess what they are.
3. Smelling game. In tin foil or jars, place items like vanilla, onion, orange, peppermint, flower, etc. Child guesses, using sense of smell.
4. Plan a picnic or a party to show interaction of:
 - a. People with other people
 - b. Work in the environment to get ready
 - c. Fun with people & environment at picnic.
5. Make a picture of any living thing: Dog, tree, child, squirrel, etc. Choose a (co

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Discipline Area Science

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Problem Orientation Ecosystem Grade K-1

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Class activity

1. Draw a human body emphasizing five senses: ears, eyes, nose, mouth, hands & feet. Children think of ways in which they have used their five senses & list them on a chart: I Hear - I Taste - I Smell - I Feel - I See.
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 - a. People with other people
 - b. Work in the environment to get ready
 - c. Fun with people & environment at picnic.
5. Make a picture of any living thing: Dog, tree, child, squirrel, etc. Choose a (cont.)

II. Outside Resource and Community Activities

A. Outside activity

1. Take a walk & enjoy the beauty of our land, air, animals & plants.
2. Find pictures of living & non-living things from magazines.
3. Trace life-cycle of themselves. Bring photographs from home. Baby → school → teen-ager → get married → have children → children go to school, etc.
4. Pet day. Child brings pet & tells class how he cares for his pet.

Resource and Reference Materials Publications:

Books:

Soon After September: The Story
of Living Things, McGraw-Hill
Co., New York

Audio-Visual:

Films:

Our Senses. What They Do for Us,

B&W, 11 min., Coronet, BAVI

Care of Pets (2nd ed.), Color,

13 min. (EBF), BAVI

Eat Well, Grow Well, Color,

11 min., Coronet, BAVI

Woodland Indians of Early

America, Color, 11 min.,

Coronet, BAVI

Community:

Nature Trail

Blind person to relate how he
enjoys nature

Continued and Additional Suggestions

I. (cont.)

magazine picture & draw a picture
sure to show all the things

Ex. - dog-doghouse, food, water

6. Child chooses one of the many
non-living things. Tell how
we take care of it.

Ex. Non-living Things

	Use	
Car	Travel	Wash & change check- Washing
Stove	Cooking Baking Frying Heat	

Conclusion: Non-living things
care for them.

7. Experiment to show that living
selves; non-living need some

Living things	No
Dog	
Tiger	
Snake	
People, etc	

8. Story: I Depend on Nature.

9. Animals reproduce to maintain
baby name: dog, pig, cat, frog,
tadpole, chick, puppy, cub, etc.

10. "Blind for Awhile" game. Tell
child's eyes. Take a walk outdoors
blindfolded child may need a

Reference Materials

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McGraw-Hill

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Continued and Additional Suggested Learning Experiences

I. (cont.)

magazine picture & draw a picture around it. Be sure to show all the things needed for survival.
Ex. - dog-doghouse, food, water, air.

6. Child chooses one of the magazine pictures of non-living things. Tell how we use them & how we take care of it.

Ex. Non-living Things

	Use	Care
Car	Travel	Wash & wax, fill with gasoline change oil, pump tires, motor check-ups.
Stove	Cooking Baking Frying Heat	Washing, fuel or power

Conclusion: Non-living things need living thing to care for them.

7. Experiment to show that living things move by themselves; non-living need some force to make them move.

Living things

Dog
Tiger
Snake
People, etc

Non-living things

Swing
Car
Stove
Bottle, etc.

8. Story: I Depend on Nature.

9. Animals reproduce to maintain species. Match adult to baby name: dog, pig, cat, frog, bear, chicken, etc. tadpole, chick, puppy, cub, kitten, piglet, etc.

10. "Blind for Awhile" game. Tie a blindfold, covering child's eyes. Take a walk outside in nature. (Each blindfolded child may need a guide).

C 3. Environmental factors are limiting
 O
 N on the numbers of organisms living
 C
 E within their influence, thus, each
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 T environment has a carrying capacity.

Discipline Area Scie
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 Problem Orientation Adap

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EX
<p><u>Cognitive:</u> Child will identify the four basic seasons and the specific characteristics of each, & animals must adapt to this climate if they are to survive.</p> <p><u>Affective:</u> The child will accept the fact that animals must adapt to the climate in order to survive.</p>	<p>I. Student-Centered in class activity</p> <p>1. Mural: Fall - make in the the fall season, Winter in winter, etc. Put in general characteristics.</p> <p>2. Play or fashion show of clothing worn each season.</p> <p>3. Pictures of activities performed during each season.</p> <p>4. Link up seasons with animal life - how seasons affect animal life (bird migration, hibernation, shedding of hair, building homes, storing of food)</p> <p>5. Give a talk: My Favorite Season.</p> <p>6. Keep temperature record for one week during each season. Compare them.</p> <p>7. Compare weather in different areas of the U.S. (newspaper, radio, TV)</p> <p>8. Booklet: Animals. Group animals in Jungle, Cold Land, Desert, Temperate, Label each.</p> <p>9. Pet Day - Child brings pet or a picture of it. Gives oral report on it.</p>
<p><u>Skills to be Learned</u></p> <p>Observation of seasonal change</p> <p>Study of animals in their environment.</p> <p>Chart story</p> <p>Play or fashion show</p> <p>Drawing</p> <p>Cause & effect relationship</p>	<p>II. C. 1</p> <p>2</p>

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Discipline Area

Subject

Problem Orientation

Science

Science

Animal

Adaptation

Grade K-1

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Mural: Fall - make in the the fall season, Winter in winter, etc. Put in general characteristics.
 2. Play or fashion show of clothing worn each season.
 3. Pictures of activities performed during each season.
 4. Link up seasons with animal life - how seasons affect animal life (bird migration, hibernation, shedding of hair, building homes, storing of food)
 5. Give a talk: My Favorite Season.
 6. Keep temperature record for one week during each season. Compare them.
 7. Compare weather in different areas of the U.S. (newspaper, radio, TV)
 8. Booklet: Animals. Group animals in Jungle, Cold Land, Desert, Temperate, Label each.
 9. Pet Day - Child brings pet or a picture of it. Gives oral report on it.

- II. Outside Resource and Community Activities
1. Locate one particular scene on the school grounds. Watch this area during each season. Make a chart story about your observation. Take a picture with your camera & mount on the chart story.
 2. Watch the sky and observe how it changes as the seasons change.

Resource and Reference Materials
Publications:

Continued and Additional Suggested

Audio-Visual:

Films:

Children in Autumn, color,
11 min. - (EBF) BAVI
Children in Winter, color,
11 min. - (EBF) BAVI
Spring Is an Adventure, color,
10 min. - (Coronet) BAVI
Summer Is an Adventure, color,
10 min. - (Coronet) BAVI
Animal Predators and the
Balance of Nature, color,
11 min. - (Journal) BAVI
Animals Protect Themselves,
color, 11 min. - (Coronet)
BAVI

Community:

Conservation Warden

Materials	Continued and Additional Suggested Learning Experiences
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Continued and Additional Suggested Learning Experiences

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Discipline Area

Subject

Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Student will point out all living things need water to survive in their environment. They will be able to draw 3 pictures of water use. Students recognize polluted water jar & distilled water jar. Affective: The students will offer examples of where they have seen water pollution.

Skills to be Learned
To differentiate differences of land from water on maps & globes
Drawing
Observation

- I. Student-Centered in class activity
1. Each child count the number of times he takes a drink in a school day.
 2. Experiment with water mixed with the following: soil, oil, etc. What happens when it stands for a while.
 3. Point out bodies of water on globes, and on an assortment of maps.
 4. Make large mural of magazine pictures or drawn pictures on uses of water.

ESEA Title III - 59-70-0135-1 Project I-C-E

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Discipline Area Science

Subject Science

Adequate

Problem Orientation Water Supply Grade K-1

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Each child count the number of times he takes a drink in a school day.
 2. Experiment with water mixed with the following: soil, oil, etc. What happens when it stands for a while.
 3. Point out bodies of water on globes, and on an assortment of maps.
 4. Make large mural of magazine pictures or drawn pictures on uses of water.

- II. Outside Resource and Community Activities
1. Tour school building & follow with discussion: kitchen, restroom, sinks, drinking fountains, janitor's room, etc. Places where water is essential.

Resource and Reference Materials
Publications:

Books:

The First Book of Water by Joe Noring.
Willy, The Story of Water by Jerome Spar.
Rain, Rain, Rivers by Shulrutz.
The Magic of Water, New York, Charles Scribner's Sons, Inc.
Good Rain by Goudey.
Not Only for Ducks, The Story of Rain, McGraw-Hill Co. N. Y.

Audio-Visual:

Pictures:

SCS or Picture file
polluted stream showing dead fish
clear stream
people fishing in farm pond
water recreation

Ecology Kit: Can I Drink The Water? 1971 Urban Systems, Inc.

Films:

We Explore the Stream - Coronet
Photographs from SCS or local water control company.

Water-How Water Helps Us, BAVI
F-181-D 11 min. (IMC)

Adventures of Junior Rain Drop, BAVI, #0022 10 min. color.

Your Friend the Water-Clean or Dirty, color, 6 min. (EBF) BAVI

Filmstrip:

The Muddy Raindrops

Community:

Continued and Additional Suggested L

Continued and Additional Suggested Learning Experiences

C 5. An adequate supply of clean air is
 O
 N essential because most organisms
 C
 E depend on oxygen, through respiration,
 P
 T to release the energy in their food.

Discipline Area _____
 Subject _____
 Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: The teacher will read the names of 8 odors. Children will stand for pleasant odors & hold their noses shut for unpleasant odors.
Affective: Teacher have child tell where he would most of all like to smell air & if he thought it was safe or not.

Skills to be Learned
 Collecting & organizing
 Experiment with things
 in child's immediate
 world
 Drawing pictures
 Physical exercises

SUGGESTED LEARNING

- I. Student-Centered in class activity
 1. Mural: "We Need Air." Include animals, people, & plants.
 2. Draw pictures of houses with chimneys, factories with smokestacks.
 3. Dust the top of a table or piano in morning. Put a book on its top. Check to see difference at end of day, second day, etc.
 4. Experiment: Child pinches nose and closes mouth while teacher counts to 10. Child tells how he feels without supply of air. Or else, tell child to hold his breath for as long as he can.
 5. Child feels his own body for his ribs and notices how chest expands when inhaling; contracts when exhaling.
 6. Find pictures from magazines of things that produce odors; matches, bathroom spray, car & truck exhaust, flowers,
(Cont.)

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Discipline Area

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y in their food.

Problem Orientation

Clean Air

Grade K-1

IVES

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Mural: "We Need Air."
Include animals, people, & plants.
2. Draw pictures of houses with chimneys, factories with smokestacks.
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4. Experiment: Child pinches nose and closes mouth while teacher counts to 10. Child tells how he feels without supply of air. Or else, tell child to hold his breath for as long as he can.
5. Child feels his own body for his ribs and notices how chest expands when inhaling; contracts when exhaling.
6. Find pictures from magazines of things that produce odors; matches, bathroom spray, car & truck exhaust, flowers,
(Cont.)

II. Outside Resource and Community Activities

Resource and Reference Materials
Publications:

Audio-Visual:

6290 Air Around Us, color,
12 min. John Colburn, BAVI

Filmstrips:

Air Around Us

Ocean of Air We Live In

True Book of Your Body and You

Community:

Tour factory-smokestacks
showing pollution

Nurse or doctor

Phy. Ed. teacher

Continued and Additional Suggested L

I. (Cont.)

barnyard manure, cooking foods l
gasoline, charcoal with a grill,
bubble baths. Make a two-section

a. Pleasant odors

b. Unpleasant odors

7. Physical exercises: walking, ho
running, galloping, tiptoeing, s
exercises use more energy and ch

e Materials	Continued and Additional Suggested Learning Experiences
<p>lor, BAVI</p> <p>In y and You</p> <p>ks</p>	<p>I. (Cont.)</p> <p>barnyard manure, cooking foods like sauerkraut, gasoline, charcoal with a grill, perking coffee, bubble baths. Make a two-section chart:</p> <ul style="list-style-type: none"> a. Pleasant odors b. Unpleasant odors <p>7. Physical exercises: walking, hopping, skipping, running, galloping, tiptoeing, sliding, etc. Faster exercises use more energy and child breathes often.</p>

C 6. Natural resources are not equally
 O
 N distributed over the earth or over
 C
 E time and greatly affect the geographic
 P
 T conditions and quality of life.

Discipline Area Science
 Subject Science
 Problem Orientation Resource

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> Have the children illustrate 2 plants, 2 animals and playground equipment they would like in their own yard. Tell the teacher individually why they like growing things in their yard.</p> <p><u>Affective:</u> The teacher will ask, "How does fresh green grass make you feel? How does grey concrete make you feel?"</p>	<p>I. Student-Centered in class activity</p> <p>1. Collect & compare colored pictures of attractive yards and of littered yards & vacant lots. Ask children where they would prefer to play. Discuss why & help them recognize that trash and litter spoil the appearance of a yard. Have the children think of places to dispose of litter: waste-baskets, trash cans, litter baskets in cars, garbage cans.</p> <p>2. Examine these pictures for equipment & games, such as fireplace or grill, picnic tables, lounges, chairs, & balls, bats, play equipment, such as swing set.</p> <p>3. Culminating activity - Make a mural of a yard. Include plants, animals, games & equipment they would like in their yard.</p>
<p><u>Skills to be Learned</u></p> <p>collect compare listening recall making a mural</p>	<p>II. Out of class activity</p> <p>1. ... pa... ow... lo... gr... sh... ma... th... on... wh... ow... 2. ... th... ob... as... ch... ea... af... up... an... fo...</p>

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geographic Subject Science
fe. Problem Orientation Resources Grade K-1

SUGGESTED LEARNING EXPERIENCES

- | | |
|---|---|
| <p>I. Student-Centered in class activity</p> <ol style="list-style-type: none">1. Collect & compare colored pictures of attractive yards and of littered yards & vacant lots. Ask children where they would prefer to play. Discuss why & help them recognize that trash and litter spoil the appearance of a yard. Have the children think of places to dispose of litter: waste-baskets, trash cans, litter baskets in cars, garbage cans.2. Examine these pictures for equipment & games, such as fireplace or grill, picnic tables, lounges, chairs, & balls, bats, play equipment, such as swing set.3. Culminating activity - Make a mural of a yard. Include plants, animals, games & equipment they would like in their yard. | <p>II. Outside Resource and Community Activities</p> <ol style="list-style-type: none">1. Take a class walk to a park or nearby yard (with owner's permission) and look for all the green growing things, as grass, shrubs, trees & plants, which make it more pleasant. (Note that green plants are the only living things in the whole world that make their own food.2. Have children recall all the kinds of animal life observed in their yards, such as birds, insects, squirrels, chipmunks, rabbits, bees, earthworms (on sidewalks after rain or when digging up ground.) Note that some animals' homes are also found there. |
|---|---|

Resource and Reference Materials
Publications:

Books:

Rabbit Hill by Robert Lawson.
Listen, Rabbit by Fisher.
A Small Lab by Keith.
You and the World Around You by
Selsam.
A Crack in the Pavement by Ruth
Howell.

Audio-Visual:

Film - Why Plants Grow Where They
Do, Corchet, 11 min. BAVI

Community:

Continued and Additional Suggest

Materials	Continued and Additional Suggested Learning Experiences
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C 7. Factors such as facilitating transportation,
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 N economic conditions, population growth, Discipline Area Science
 C
 E and increased leisure time have a great Subject Science
 P
 T influence on changes in land use and Problem Orientation Transport
 centers of population density.

BEHAVIORAL OBJECTIVES

Cognitive: The child will draw 4 types of transportation used around his city. Children may draw pictures of where their father works & how their family uses his paycheck.
Affective: Each child will use different modes of traveling (walk, run, car, bicycle, car, bus) to go over to see a friend. They will tell why they like this method.

Skills to be Learned
 Collecting pictures
 Discussions
 Community studies
 Comparisons

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Let's take a trip. How will we travel?

a. To go shopping in the nearest town?

b. To visit relatives 50 miles away?

c. To a strange & busy city such as New York or Chicago?

d. To Disneyland, if father only has one week of vacation?

e. To Japan?

f. To Washington Island from Gills Rock in northern Door County?

g. Other travel examples.

2. Children can plan a trip to a place they would like to visit.

a. List things they would need to pack in their own suitcases.

b. List things, besides clothing, the family would need for the trip. (food, cameras, bedding, spare tire, etc.)

(cont.)

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tions, population growth, Discipline Area Science

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changes in land use and Problem Orientation Transportation Grade K-1
population density.

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Let's take a trip. How will we travel?
 - a. To go shopping in the nearest town?
 - b. To visit relatives 50 miles away?
 - c. To a strange & busy city such as New York or Chicago?
 - d. To Disneyland, if father only has one week of vacation?
 - e. To Japan?
 - f. To Washington Island from Gills Rock in northern Door County?
 - g. Other travel examples.
2. Children can plan a trip to a place they would like to vist.
 - a. List things they would need to pack in their own suitcases.
 - b. List things, besides clothing, the family would need for the trip. (food, cameras, bedding, spare tire, etc.)

(cont.)

II. Outside Resource and Community Activities

A. Outside classroom

1. Find pictures of the different means of transportation, using magazines or newspapers. Paste these pictures on a mural & finish the scenery with crayon, craypas or paint.
2. Take a trip to the nearest town or city. Why do people live there? (Nearness to work, closer neighbors) How is the land used? (Homes, factories, stores, sidewalks, highways, lawn, gardens, trees, parks, etc.)
3. Count the number of steps to your friends house. How many minutes did the walk take? Could you travel there a faster way? If you took your bicycle, how long would it take?
4. Visit city park to

(cont.)

Resource and Reference Materials
Publications:

Audio-Visual:

Films:

Transportation: Footpath to Air Lane, Color, 16 min., BAVI, Churchill

Children at Work & Play Around the World, B&W, 20 min., BAVI, United World

America, the Beautiful, Color, 20 min., BAVI

Fishin' Fun In Wisconsin, Color, free from Conservation Div.

The City, Color, 11 min., BAVI

EBF

Community:

Trip to motel or resort
Have parents show slides of recent travel

Trip to town or city to study why larger pop. than rural area

City park to see facilities guided by recreation director

Continued and Additional Suggested Learning

I. (cont.)

3. Children tell what they do with time. Ask what their mom & dad do.
4. Write a class story about going they were pioneers. (Covered wagon, horse & buggy, walking, stagecoach) it take longer to travel? How would care of the horse?

5. Class booklet, "My Daddy Goes to work" child draws his house, his father to work (tell mileage), the place his paycheck, where he spends the place he saves the money.

6. Talk about resort towns such as Why do people like to vacation there from the city, to do leisure time boating, picnics, photography, swimming, skiing, hiking, fishing) What activities during winter, fall & spring?

7. Creative dramatics. Act out how desirable for efficiency & aesthetic for tools & supplies, & also time flowers & shrubbery, pruning, working cutting lawn, cleaning windows, etc. inside of the house & garage.

8. Compare schools of today & long ago eight grades, within walking distance furniture, etc. Now--bus transportation, room, audio-visual equipment, furniture school building & audio-visual de

II. (cont.)

see facilities for young & old. Not & backyards. Why are parks necessary

Materials	Continued and Additional Suggested Learning Experiences
<p>to Air VI, round BAVI, olor, Color, iv. BAVI</p>	<p>I. (cont.)</p> <ol style="list-style-type: none"> 3. Children tell what they do with their leisure time. Ask what their mom & dad do for hobbies. 4. Write a class story about going on a trip if they were pioneers. (Covered wagons, horseback, horse & buggy, walking, stagecoach, etc.) Would it take longer to travel? How would you take care of the horse? 5. Class booklet, "My Daddy Goes to Work". Each child draws his house, his father traveling to work (tell mileage), the place he works at, his paycheck, where he spends the money & the place he saves the money. 6. Talk about resort towns such as Door County has. Why do people like to vacation there? (It is away from the city, to do leisure time activities--boating, picnics, photography, swimming, water skiing, hiking, fishing) What activities take place during winter, fall & spring? 7. Creative dramatics. Act out how homes are kept desirable for efficiency & aesthetics. (Takes money for tools & supplies, & also time): painting, planting flowers & shrubbery, pruning, working in garden, cutting lawn, cleaning windows, cleaning & straightening inside of the house & garage. 8. Compare schools of today & long ago. (Long ago--all eight grades, within walking distance of home, furniture, etc. Now--bus transportation, one grade per room, audio-visual equipment, furniture) Take tour of school building & audio-visual department. <p>II. (cont.)</p> <p>see facilities for young & old. Notice residential area & backyards. Why are parks necessary?</p>

C 8. Cultural, economic, social, and
 O political factors determine status
 N
 C of man's values and attitudes
 E
 P toward his environment.
 T

Discipline Area Science
 Subject Science
 Economics
 Problem Orientation Social Cul

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIE	
<p><u>Cognitive:</u> Child can recite poems, sing songs, & tell about pictures of nature. He will take part in making a bulletin board of pupils having fun. He will share his rock collection with other children.</p> <p><u>Affective:</u> Playing out-of-doors is fun. Why?</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. List tree products in the classroom. 2. Point to things made of metal in room (coat hangers, window, silverware, door knob, chair, chalk, ring, etc.) <p>How do we use these products?</p> <ol style="list-style-type: none"> 3. Find pictures showing people who enjoy nature: picnicking, fishing, camping, boating, golfing, swimming, hiking, etc. 4. Paint a mural of children's ideas of having fun. 5. Make a list of ways in which rock is used in the natural state in the community. 	<p>II. Outsi</p> <p>Commun</p> <ol style="list-style-type: none"> 1. Chi 2. Tri <p>rocks</p> <p>a roc</p> <p>to ap</p> <p>offer</p> <p>to se</p>
<p><u>Skills to be Learned</u></p> <p>Appreciation of literature</p> <p>Creative writing</p> <p>Make own rock collection</p> <p>Make bulletin board, "I Enjoy Nature."</p>		

conomic, social, and
 determine status
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 onment.

Discipline Area Science
 Subject Science
Economics &
 Problem Orientation Social Culture Grade K-1

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
<p>can songs, res of ke part in board un. He k col- chil-</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. List tree products in the classroom. 2. Point to things made of metal in room (coat hangers, window, silverware, door knob, chair, chalk, ring, etc.) <p>How do we use these products?</p> <ol style="list-style-type: none"> 3. Find pictures showing people who enjoy nature: picnicking, fishing, camping, boating, golfing, swimming, hiking, etc. 4. Paint a mural of children's ideas of having fun. 5. Make a list of ways in which rock is used in the natural state in the community. 	<p>II. Outside Resource and Community Activities</p> <ol style="list-style-type: none"> 1. Children like to collect rocks so let each child make a rock collection. 2. Trip to local filling station to appreciate service he is offering so we can travel to see our country.
<p>ed literature lection rd, "I</p>		

Resource and Reference Materials
Publications:

Books:

You and the Earth Beneath Us by
Julian May.
Rocks and Minerals by Lou Page.

Audio-Visual:

Films:

Treasures of the Earth, color,
11 min. BAVI
Minerals and Rocks, color, 13 min.
BAVI
Let's Take a Walk in the Woods,
color, 11 min., BAVI
Trees - How To Identify Them,
color, 11 min., BAVI
Your Friend the Forest - Save It
or Destroy It, color, 6 min.
BAVI

Community:

stone quarry
stone polisher
gas station

Continued and Additional Suggest

Continued and Additional Suggested Learning Experiences

C. 10. Short-term economic gains may
produce long-term environmental
losses.

Discipline Area Science
 Subject Science
 Problem Orientation Land

BEHAVIORAL OBJECTIVES

Cognitive: Through creative
 dramatics, the child will
 choose various roles (such
 as trees, flowers, bulldozers,
 etc.) to show what happens
 when a wildlife area is
 disturbed. e.g. Trees,
 flowers, & animals homes are
 destroyed.
Affective: Children will
 tell voluntarily what is
 destroyed when a new road is
 built or a campfire is not
 taken care of & becomes a
 woods or forest fire.

Skills to be Learned

Diarama of destruction to a
 forest
 Dismantling of bulletin board
 destroys attractiveness
 Making pollution cartoons
 List machines man uses to
 make changes

SUGGESTED LEARNING EX

I. Student-Centered in class activity

A. Classroom

1. "Pick a Pretty Flower"
 bulletin board to show how
 many things can soon be
 destroyed. First admire the
 flowers. Then tell each
 child to go & pick one.
 Soon there's few left. This
 same thing happens when
 things of nature are destroy
2. Diarama: Set up a forest of
 big & little trees. Use a
 child's toy payloader to up-
 root the trees to build sever
 houses in their place. House
 may be shoebox homes. People
 come to live there but there
 are no trees. If a little fo
 sight is used, a few select
 trees should have been pre-
 served. Now it will take yea
 to grow a tree of any size.
3. Show pictures of factory sm
 pollution & transportation
 vehicles. Make cartoons of w
 will happen to people. Air i
 polluted that some people ha
 wear oxygen air masks or fil
 in order to breathe. Show re
 watery eyes with blurred (co

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Discipline Area Science

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Problem Orientation Land Use

Grade K-1

ACTIVITIES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Classroom

1. "Pick a Pretty Flower"
bulletin board to show how many things can soon be destroyed. First admire the flowers. Then tell each child to go & pick one. Soon there's few left. This same thing happens when things of nature are destroyed.
2. Diarama: Set up a forest of big & little trees. Use a child's toy payloader to up-root the trees to build several houses in their place. Houses may be shoebox homes. People come to live there but there are no trees. If a little foresight is used, a few select trees should have been preserved. Now it will take years to grow a tree of any size.
3. Show pictures of factory smoke, pollution & transportation vehicles. Make cartoons of what will happen to people. Air is so polluted that some people have to wear oxygen air masks or filters in order to breathe. Show red, watery eyes with blurred (cont.)

II. Outside Resource and
Community Activities

A. Out of class

1. Have agriculture teacher or farmer visit to tell how he rotates his crops. Also why he fertilizes & sprays some crops. What machinery is used to do these jobs?
2. Find magazine pictures of farm machinery.
3. Visit highway under construction & watch man's machinery. How will the highway help the community? Does it harm a natural area for wildlife & plants?

Resource and Reference Materials	Continued and Additional Suggested Le
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p><u>The Little House</u>, Virginia Lee Bates, Houghton Mifflin, 1970 <u>Miguel's Mountain</u>, Bill Binzen, Coward-McCann</p> <p><u>Audio-Visual:</u></p> <p><u>Film:</u></p> <p><u>Dairy Farm</u>, 2nd ed., Color, 14 min., Coronet, BAVI</p> <p><u>Teacher takes own slides:</u></p> <p>Farm land Farm machinery Housing development Factory pollution Highway construction</p> <p><u>Community:</u></p> <p>Farmer Agriculture teacher Housing development area Factory Highway construction</p>	<p>I. (cont.)</p> <p>vision. People will be coughing. P lung or heart disease & the elder affected.</p>

Materials

Continued and Additional Suggested Learning Experiences

I. (cont.)

vision. People will be coughing. People with chronic lung or heart disease & the elderly will be badly affected.

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 E environmental alterations over time.
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Problem Orientation Wa

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p>Cognitive: Child will know that if others do exactly what he does, noticeable changes will take place. If he does something good, more good will take place. Ex. tree planting. If bad, more bad will occur. Ex. littering. Affective: The children will voluntarily pick up after himself in and outside of the classroom.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Litterbug Game - Each child finds something in his desk that he no longer wants. Go outside or remain in classroom. One child drops his unwanted item (litter) - the change is not too bad. But then have a few more go - then ever one drop their litter. Next step: Clean up - put in trash can. (Encourage high school age or art class to design attractive litter containers.) 2. Litter Bug bulletin board Draw outline of a huge bug. Children go on a "pick-up litter" walk. When they come back, glue litter found to "Litter Bug" bulletin board. 3. Make individual litter bags with slogans in art class. Use them for pick-up at school, then have them use them in their family car or elsewhere. (cont.
<p>Skills to be Learned</p> <ul style="list-style-type: none"> Ways to help with litter problems Planting tree procedures Murals of results of a forest fire 	

1 acts, duplicated

, produce significant

alterations over time.

Discipline Area Science

Subject Science

Problem Orientation Waste Disposal Grade K-1

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Litterbug Game - Each child finds something in his desk that he no longer wants. Go outside or remain in classroom. One child drops his unwanted item (litter) - the change is not too bad. But then have a few more go - then everyone drop their litter. Next step: Clean up - put in trash can. (Encourage high school ag or art class to design attractive litter containers.)
2. Litter Bug bulletin board. Draw outline of a huge bug. Children go on a "pick-up litter" walk. When they come back, glue litter found to "Litter Bug" bulletin board.
3. Make individual litter bags with slogans in art class. Use them for pick-up at school, then have them use them in their family car or elsewhere. (cont.)

II. Outside Resource and Community Activities

A. Outside classroom

1. Arbor Day - Have a tree planting ceremony at your school. Choose a protective, attractive area where it will add to the school's beauty. Give each child a seedling to plant at home. Tree will grow up with the child.
2. Take a nature walk.

Resource and Reference Materials
Publications:

Books:

Once There Was A Tree, Discovering Nature Series, Phyllis S. Busch, World Publishing
Patterns of Nature, Jeffrey Baker, Doubleday

Audio-Visual:

Films:

Garbage, CESA 9 Agency
Litterbug, Color, 10 min., Avis, BAVI
The Litterbug, Walt Disney, 8 min.
Forests, Color, 10 min., Gateway, BAVI
Your Friend the Forest. Save It or Destroy It, Color, 6 min. EBF, BAVI

Kit: Forest Fire Prevention & Conservation Kit (Contact Local Forester) State Forester
710 North Sixth Street
Milwaukee, Wis. 53202

Community:

Forest Ranger
Janitor
Nursery or Greenhouse

Continued and Additional Suggestions

I. (cont.)

4. Let the child who found "a Day" or "Queen for a Day"
5. Tell janitor to not erase. This will be similar to At the end of the week waste baskets. Was the it have been erased rather new? Separate paper for
6. Have janitor show child waste from the waste basket
7. Murals: Forest Fires.
 - a. Draw what someone matches, campfires
 - b. Draw trees burning forest homes.
 - c. Results of the fire desperate to find a
8. Read about "Smokey, the picture or write a short
9. Stress that wild flowers enjoyed and not picked (Hayes Pub). Learn to

Materials	Continued and Additional Suggested Learning Experiences
<p>Discovering S. Busch, rey Baker, Avis, PA y, 8 min. Gateway, Save It min. EBF, on & Local</p>	<p>I. (cont.)</p> <ol style="list-style-type: none"> 4. Let the child who found the most litter be "King for a Day" or "Queen for a Day". 5. Tell janitor to not empty waste baskets for one week. This will be similar to garbage pick-up once a week. At the end of the week, analyze the contents of the waste baskets. Was the paper really unusable & could it have been erased rather than wasting it and taking new? Separate paper for recycling. 6. Have janitor show children what he does with the waste from the waste baskets. 7. Murals: Forest Fires. <ol style="list-style-type: none"> a. Draw what someone did that started the fire: matches, campfires left unattended, cigarettes. b. Draw trees burning & wildlife fleeing from their forest homes. c. Results of the fire: blackened stumps & wildlife desperate to find a new home. 8. Read about "Smokey, the Bear". Let children draw his picture or write a short story. 9. Stress that wild flowers in the area should be enjoyed and not picked. Bulletin board, "Wild Flowers" (Hayes Pub). Learn to recognize.

C 12. Private ownership must be re-
O garded as a stewardship and should
N
C
E not encroach upon or violate
P
T the individual right of others.

Discipline Area Science

Subject Science

Problem Orientation Land U

BEHAVIORAL OBJECTIVES

Cognitive: By observation, the student will observe that negligence in caring for resources results in damage and destruction to those resources.
Affective: By his behavior in the classroom, the student will show his regard to the rights of others.

Skills to be Learned

SUGGESTED LEARNING EXPERIENCES

- | I. Student-Centered in class activity | II. Out of class activity |
|--|------------------------------------|
| 1. Show pictures of a shabby farm or house or factory. Ask children how they would improve its appearance. | 1. T "e ya ey (c ar no di th fr us |
| 2. Discuss reasons for a side-walk. If everyone walks on grass, grass will die, and a path will be worn. | 2. S la in |
| 3. Child draws a picture. Another child then puts black marks on it. (Spoils picture and it distracts from its original beauty.) | 3. S po wa (R it di fi wa fi is |
| | 4. L ar lo Co wa |

ership must be re-
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on or violate
right of others.

Discipline Area Science
 Subject Science
 Problem Orientation Land Use Grade K-1

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
vation, bserve caring lts in tion to behavior the student rd to the	I. Student-Centered in class activity 1. Show pictures of a shabby farm or house or factory. Ask children how they would improve its appearance. 2. Discuss reasons for a side-walk. If everyone walks on grass, grass will die, and a path will be worn. 3. Child draws a picture. Another child then puts black marks on it. (Spoils picture and it distracts from its original beauty.)	II. Outside Resource and Community Activities 1. Talk a walk to look for "eyesores." Look at junkyard-so displeasing to the eye. What can be done? (dismantle and recycle glass and metal). A junkyard is not really pollution but is displeasing to the eye, thus the owner should screen it from view by a tall fence, use trees as a visual shield) 2. Show cow path in field or lane from machinery traveling. 3. Show factory smoke stacks polluting air and dumping waste products into water. (Results: dirty air making it difficult to breathe, discolored water, plants and fish die, algae on top of water, nobody can swim or fish or boat in it. Beauty is destroyed.) 4. Litterbugging makes picnic area, home, school, etc., look displeasing to the eye. Conduct litterbug clean-up walks.

Resource and Reference Materials
Publications:

Continued and Additional Suggeste

Audio-Visual:

Teacher should take own
slides:

shabby farms or houses
attractive homes
factories at work
junk yards
incinerators
picnic areas
paths worn by walking

Community:

Take slides of community:
junkyard
dump area

Materials	Continued and Additional Suggested Learning Experiences
-----------	---

	<p>Continued and Additional Suggested Learning Experiences</p> <p>1. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>2. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>3. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>4. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>5. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>6. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>7. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>8. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>9. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p> <p>10. Read the story "The Boy Who Cried Wolf" and discuss the importance of honesty.</p>
--	---

PROJECT I-C-E

Episode Evaluation Form
(Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish format. Please feel free to adapt it and add more pages. Let us and comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials
(specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

On each episode used in your class, you may wish to duplicate this suggested form. Feel free to adapt it and add more pages. Let us know all your critiques, both negative and positive.

Objectives

:

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arning Experiences

Community Activities:

ource & Reference Materials
uggestions & comments)

ED055918

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENTAL EDUCATION

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 1

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
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Robert
Robert
George

- C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

NTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

AREA Science GRADE 1

nder Title III E.S.E.A.

C-E

hools in CESA's 3-8-9

Street

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Robert Warpinski, Director
Robert Kellner, Ass^d. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, hear from over a hundred teachers, year long meetings, a summer workshop with ecologists, this guide means realistic, developed aid for you. We, which have directed teachers in writing and editing this guide,

1. This guide is supplementary in nature and the episodes are resources--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know you will have to adapt, adopt, or use. By design, the range of suggestion, experimentation and usage are even wider. Many episodes are self-explanatory, others can be changed in part or developed more keenly over time. Possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning plan. The reasons are simple. No guide has all the answers unless viewed in the context of your classroom situation. Give it a triple reading, check over the resources listed, prime your students, and seek help. The Project personnel and knowledge page stand ready to aid your efforts. Feel free to ask.
4. The Project Resource Materials Center serves all CESA 3, public, private. We will send available materials pre-paid. Call for a visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library. Center materials. Please offer suggestions, comments, or requests. Service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with suggestions on the episode pages or use the attached evaluation form. lected in late May next year and will be used in our review reactions and suggestions--negative and positive. Please use the episodes may refer to specific, local community resources, individual school districts and teachers will have substitutes. A list of terms pertinent to the episodes is being developed.
7. Ecologists and other experts have simplified the issue--sustainability. Creation's beauty and complexity--often noted as the work of a year and human energy to save. A year's work by a hundred of your gesture. Without you, their work will crumble, and so might our world. Let us live to think, feel, and act in harmony with our world.

1. Cognitive means a measurable mental skill, ability, or knowledge.
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels for achievement).
4. EPA - Environmental Problem Area

PREFACE

excite students about their environment, help is ready. Thanks to the efforts of teachers, year long meetings, a summer workshop, university consultants and this guide means realistic, developed aid for you. Please note the following ideas and teachers in writing and editing this guide. Supplementary in nature and the episodes are designed--at appropriate instances--to existing, logical course content. Each episode offers suggestions. Since you know your students best, you decide what to use, or use. By design, the range of suggestions is wide; your chances for experience are even wider. Many episodes are self-contained, others open-ended, still others changed in part or developed more keenly over a few weeks. These built-in episodes allow you to explore. When you try the episodes and suggested learning experiences but please pre-plan the episodes are simple. No guide has all the answers and no curriculum will work in the context of your classroom situation. Thus, before trying an episode, read the reading, check over the resources listed, make mental and actual notes, ask questions, and seek help. The Project personnel and teachers listed on the acknowledgment stand ready to aid your efforts. Feel free to ask their help in pre-planning. The Resource Materials Center serves all CESA 3, 8, and 9 area schools--public and private. We will send available materials pre-paid. Call for any help, materials, or to 2-4338.

Project ICE Bibliography in your school library for available Resources. Please offer suggestions, comments, or advice--at any time--so that this work will help each other. Work with the guide by reacting to it with scratch ideas, notes, and extended use of the episode pages or use the attached evaluation format, which will be collected May next year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed may refer to specific, local community resources or conditions. In such cases, local school districts and teachers will have to adopt local or available substitutes of terms pertinent to the episodes is below. Other experts have simplified the issue--survival--yours, mine, our students, the complexity and complexity--often noted as the work of a genius--will take our genius to save. A year's work by a hundred of your fellow teachers is a saving to you, their work will crumble, and so might we all--literally. Instead, think, feel, and act in harmony with our world.

Editorial Board

Plans a measurable mental skill, ability, or process based on factual data. Refers to student attitudes, values, and feelings. Acceptable Performance Will Include (labels a cognitive or mental performance.) Environmental Problem Area

ACKNOWLEDGEMENTS: The following teachers and consultants participated in the of the Supplementary Environmental Education Guide.

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Emmajean Harmann, Sevastopol
Ray Gantenbein, Green Bay
David Bartz, Sturgeon Bay
John Hussey, Green Bay
Sister Barbara, St. Bernard

Ednajeane Purcell, OSU
Innette David West, Lawrence U.

Robert Cook, UWGB
Dennis Bryan, UWGB

C Energy from the sun, the basic source

O
N of all energy, is converted through

Discipline Area Scien

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E plant photosynthesis into a form all

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T living things can use for life pro-

Problem Orientation Energy

cesses (1)

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXP

Cognitive: To recognize the sun & to tell 3 ways in which the sun makes me change clothes. To compare results when plants have sun or are without sun.
Affective: Children will accept that the sun is essential for all life on earth.

Skills to be Learned

Decision as to importance of sun to plants through experiments.

Planting and observing growth

Keeping records of weather changes.

Measuring shadows.

I. Student-Centered in class activity

1. Paper doll figures. Dress with different clothes on rainy, sunny, and cold days. What different activities do you do when weather changes.

2. Weather calendar: keep track of the weather for the month. Enumerate days of similar weather.

3. Demonstration: Two plants and one box are needed. Place in sunlight. Cover one with a box, leave other in direct sunlight.

4. Place plant in window. Turn it and observe how its leaves will turn towards the sunlight.

5. Chart: Seeds, and Plants They Become. Save package from seeds and use cuter pictures. Also-plant seed in glass jar. On outside of jar, tape seed samples so child sees seed and plant.

6. Booklet: Fruits and Vegetables. Indicate part of plant we consume.

(cont.)

ESEA Title III - 59-70-0135-1 Project I-C-E

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Grade K-1

Processes (1)

ACTIVES

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class activity

1. Paper doll figures. Dress with different clothes on rainy, sunny, and cold days. What different activities do you do when weather changes.
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6. Booklet: Fruits and Vegetables. Indicate part of plant we consume.

(cont.)

II. Outside Resource and Community Activities

1. Go outside 3 times a day and watch your shadow. Trace it and watch it move.
2. If possible, gain access to a small plot of land and plant a garden in spring.

sun
life

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rough
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Resource and Reference Materials
Publications:

Books:

Science for Work and Play,
Herman & Nina Schneider.
Concepts in Science, Brandwein,
Cooper, Blackwood, & Hone.

Audio-Visual:

Films:

Shadows on Our Turning Earth,
Associates of California.
Food from the Sun, color, 10 min.
(EBF) - BAVI
Planting Our Garden, color
11 min., Coronet, BAVI

Filmstrips:

Sun Up (Weston Woods Story
Films)
The Sun's Family
Susan and Peter Dress to Match
the Weather
Spring Is Here
Winter Is Here
Summer Is Here
Autumn Is Here

Community:

Trip: Greenhouse

Continued and Additional Su

I. (cont.)

7. Trees have different
mas, shade, firewood,
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8. Compare a garden, gr
9. Place hand in direct
Compare difference in
10. Sun's rays create ch
sunlight. (Will fade.
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Continued and Additional Suggested Learning Experiences

I. (cont.)

7. Trees have different uses: evergreens for Christmas, shade, firewood, produce fruits and nuts, beautification, animal homes, lumber.
8. Compare a garden, greenhouse, field.
9. Place hand in direct sunlight and another in shade. Compare difference in temperature.
10. Sun's rays create change. Place colored paper in sunlight. (Will fade.) What happens when you're out in sun. (Sunburn.) Therefore, when sun shines on plant leaves a change takes place. (Photosynthesis.)

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C 2. All living organisms interact among
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 C forming an intricate unit called an
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Discipline Area Sc

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Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARN

Cognitive: Child will circle names of living things when given a list of living & non-living things. He will write a story about taking care of his pet or how any other animal survives. He will draw a picture of the things he enjoys on a nature walk.

Affective: There is an awakening of his senses through participation in all phases of his life.

Skills to be Learned

Distinguish between living & non-living things

Cooperation with other children when planning an environmental outing

Relate to class how he cares for his own pet

Write stories about how we depend on nature

I. Student-Centered in class activity

A. Class activity

1. Draw a human body emphasizing five senses: ears, eyes, nose, mouth, hands & feet. Children think of ways in which they have used their five senses & list them on a chart: I Hear - I Taste - I Smell - I Feel - I See.
2. Blindfold game. Have familiar objects for the child to guess what they are.
3. Smelling game. In tin fo or jars, place items like vanilla, onion, orange, peppermint, flower, etc. Child guesses, using sense of smell.
4. Plan a picnic or a party to show interaction of:
 - a. People with other people
 - b. Work in the environment to get ready
 - c. Fun with people & environment at picnic.
5. Make a picture of any living thing: Dog, tree, child, squirrel, etc. Choose a

ESEA Title III - 59-70-0135-1 Project I-C-E

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Problem Orientation Ecosystem Grade K-1

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SUGGESTED LEARNING EXPERIENCES

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 - a. People with other people
 - b. Work in the environment to get ready
 - c. Fun with people & environment at picnic.
5. Make a picture of any living thing: Dog, tree, child, squirrel, etc. Choose a (cont.)

II. Outside Resource and Community Activities

A. Outside activity

1. Take a walk & enjoy the beauty of our land, air, animals & plants.
2. Find pictures of living & non-living things from magazines
3. Trace life-cycle of themselves. Bring photographs from home. Baby → school → teen-ager → get married → have children → children go to school, etc.
4. Pet day. Child brings pet & tells class how he cares for his pet.

Resource and Reference Materials	Continued and Additi
<u>Publications:</u> <u>Books:</u> <u>Soon After September: The Story</u> <u>of Living Things, McGraw-Hill</u> <u>Co., New York</u>	I. (cont.) magazine pictur sure to show al Ex. - dog- dogh 6. Child chooses non-living thin we take care of Ex. <u>No</u> <u>Use</u> Car Travel Stove Cooking Baking Frying Heat Conclusion: Non care for them. 7. Experiment to selves; non-liv <u>Living thing</u> Dog Tiger Snake People, e 8. Story: <u>I Depen</u> 9. Animals repro baby name: dog, tadpole, chick, 10. "Blind for Awh child's eyes. T blindfolded chi
<u>Audio-Visual:</u> <u>Films:</u> <u>Our Senses. What They Do for Us,</u> <u>B&W, 11 min., Coronet, BAVI</u> <u>Care of Pets (2nd ed.), Color,</u> <u>13 min. (EBF), BAVI</u> <u>Eat Well, Grow Well, Color,</u> <u>11 min., Coronet, BAVI</u> <u>Woodland Indians of Early</u> <u>America, Color, 11 min.,</u> <u>Coronet BAVI</u>	
<u>Community:</u> <u>Nature Trail</u> Blind person to relate how he enjoys nature	

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Continued and Additional Suggested Learning Experiences

I. (cont.)

magazine picture & draw a picture around it. Be sure to show all the things needed for survival.

Ex. - dog-doghouse, food, water, air.

6. Child chooses one of the magazine pictures of non-living things. Tell how we use them & how we take care of it.

Ex. Non-living Things

	<u>Use</u>	<u>Care</u>
Car	Travel	Wash & wax, fill with gasoline change oil, pump tires, motor check-ups.
Stove	Cooking Baking Frying Heat	Washing, fuel or power

Conclusion: Non-living things need living thing to care for them.

7. Experiment to show that living things move by themselves; non-living need some force to make them move.

Living things

Dog
Tiger
Snake
People, etc

Non-living things

Swing
Jar
Stove
Bottle, etc.

8. Story: I Depend on Nature.
9. Animals reproduce to maintain species. Match adult to baby name: dog, pig, cat, frog, bear, chicken, etc. tadpole, chick, puppy, cub, kitten, piglet, etc.
10. "Blind for Awhile" game. Tie a blindfold, covering child's eyes. Take a walk outside in nature. (Each blindfolded child may need a guide).

C 3. Environmental factors are limiting
 O
 N on the numbers of organisms living
 C
 E within their influence, thus, each
 P
 T environment has a carrying capacity.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> Child will identify the four basic seasons and the specific characteristics of each, & animals must adapt to this climate if they are to survive.</p> <p><u>Affective:</u> The child will accept the fact that animals must adapt to the climate in order to survive.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Mural: Fall - make in the the fall season, Winter in winter, etc. Put in general characteristics. 2. Play or fashion show of clothing worn each season 3. Pictures of activities performed during each season. 4. Link up seasons with animal life - how seasons affect animal life (bird migration, hibernation, shedding of hair, building homes, storing of food) 5. Give a talk: My Favorite Season. 6. Keep temperature record for one week during each season. Compare them. 7. Compare weather in different areas of the U.S. (newspaper, radio, TV) 8. Booklet: Animals. Group animals in Jungle, Cold Land, Desert, Temperate, Label each. 9. Pet Day - Child brings pet or a picture of it. Gives oral report on it.
<p><u>Skills to be Learned</u></p> <p>Observation of seasonal change</p> <p>Study of animals in their environment.</p> <p>Chart story</p> <p>Play or fashion show</p> <p>Drawing</p> <p>Cause & effect relationship</p>	

Environmental factors are limiting

Numbers of organisms living

Their influence, thus, each

Environment has a carrying capacity.

Discipline Area

Subject

Problem Orientation

Science

Science

Animal

Adaptation

Grade

K-1

ORAL OBJECTIVES

Child will
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

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5. Give a talk: My Favorite Season.
6. Keep temperature record for one week during each season. Compare them.
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8. Booklet: Animals. Group animals in Jungle, Cold Land, Desert, Temperate, Label each.
9. Pet Day - Child brings pet or a picture of it. Gives oral report on it.

II. Outside Resource and Community Activities

1. Locate one particular scene on the school grounds. Watch this area during each season. Make a chart story about your observation. Take a picture with your camera & mount on the chart story.
2. Watch the sky and observe how it changes as the seasons change.

Resource and Reference Materials
Publications:

Continued and Additional Sup

Audio-Visual:

Films:

Children in Autumn, color,
11 min. - (EBF) BAVI

Children in Winter, color,
11 min. - (EBF) BAVI

Spring Is an Adventure, color,
10 min. - (Coronet) BAVI

Summer Is an Adventure, color,
10 min. - (Coronet) BAVI

Animal Predators and the
Balance re, color,
11 m nal) BAVI

Animals Save Themselves,
color, 11 min. - (Coronet)
BAVI

Community:

Conservation Warden

Continued and Additional Suggested Learning Experiences

C 4. An adequate supply of pure

O
N
C
E
P
T

water is essential for life.

Discipline Area Sci

Subject Sci

Problem Orientation Wat

BEHAVIORAL OBJECTIVES

Cognitive: Student will point out all living things need water to survive in their environment. They will be able to draw 3 pictures of water use. Students recognize polluted water jar & distilled water jar.
Affective: The students will offer examples of where they have seen water pollution.

Skills to be Learned
To differentiate differences of land from water on maps & globes
Drawing
Observation

SUGGESTED LEARNING

- | I. Student-Centered in class activity | II. |
|---|-----|
| 1. Each child count the number of times he takes a drink in a school day. | |
| 2. Experiment with water mixed with the following: soil, oil, etc. What happens when it stands for a while. | |
| 3. Point out bodies of water on globes, and on an assortment of maps. | |
| 4. Make large mural of magazine pictures drawn picture of water. | |

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Problem Orientation Water Supply Grade K-1

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Each child count the number of times he takes a drink in a school day.
 2. Experiment with water mixed with the following: soil, oil, etc. What happens when it stands for a while.
 3. Point out bodies of water on globes, and on an assortment of maps.
 4. Make large mural of magazine pictures or drawn pictures on uses of water.

- II. Outside Resource and Community Activities
1. Tour school building & follow with discussion: kitchen, restroom, sinks, drinking fountains, janitor's room, etc. Places where water is essential.

Resource and Reference Materials	Continued and Additional
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p><u>The First Book of Water</u> by Joe Norling.</p> <p><u>Willy, The Story of Water</u> by Jerome Spar.</p> <p><u>Rain, Rain, Rivers</u> by Shulrutz.</p> <p><u>The Magic of Water</u>, New York, Charles Scribner's Sons, Inc.</p> <p><u>Good Rain</u> by Goudey.</p> <p><u>Not Only for Ducks, The Story of Rain</u>, McGraw-Hill Co. N. Y.</p> <p><u>Audio-Visual:</u></p> <p><u>Pictures:</u></p> <p>SCS or Picture file</p> <p>polluted stream showing dead fish</p> <p>clear stream</p> <p>people fishing in farm pond</p> <p>water recreation</p> <p>Ecology Kit: <u>Can I Drink The Water?</u> 1971 Urban Systems, Inc.</p> <p><u>Films:</u></p> <p><u>We Explore the Stream</u> - Coronet</p> <p>Photographs from SCS or local water control company.</p> <p><u>Water-How Water Helps Us</u>, BAVI F-181-D 11 min. (IMC)</p> <p><u>Adventures of Junior Rain Drop</u>, BAVI, #0022 10 min. color.</p> <p><u>Your Friend the Water-Clean or Dirty</u>, color, 6 min. (EBF) BAVI</p> <p><u>Filmstrip:</u></p> <p><u>The Muddy Raindrops</u></p> <p><u>Community:</u></p>	

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Continued and Additional Suggested Learning Experiences

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ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGEST
<p><u>Cognitive:</u> The teacher will read the names of 8 odors. Children will stand for pleasant odors & hold their noses shut for unpleasant odors.</p> <p><u>Affective:</u> Teacher have child tell where he would most of all like to smell air & if he thought it was safe or not.</p>	<p>I. Student-Centered in activity</p> <ol style="list-style-type: none"> 1. Mural: "We Need Air" Include animals, people & plants. 2. Draw pictures of houses with chimneys, factories with smokestacks. 3. Dust the top of a book or piano in morning. See to see difference at end of day, second day, etc. 4. Experiment: Child holds nose and closes mouth while teacher counts. Child tells how he feels without supply of air. Else tell child to hold his breath for as long as he can. 5. Child feels his own ribs and notices how chest expands while inhaling; contracts while exhaling. 6. Find pictures from magazines of things that produce odors; match bathroom spray, car, truck exhaust, flowers. (Con
<p><u>Skills to be Learned</u></p> <p>Collecting & organizing Experiencing with things in child's immediate world</p> <p>Drawing pictures</p> <p>Physical exercises</p>	

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Mural: "We Need Air."
Include animals, people, & plants.
2. Draw pictures of houses with chimneys, factories with smokestacks.
3. Dust the top of a table or piano in morning. Put a book on its top. Check to see difference at end of day, second day, etc.
4. Experiment: Child pinches nose and closes mouth while teacher counts to 10. Child tells how he feels without supply of air. Or else, tell child to hold his breath for as long as he can.
5. Child feels his own body for his ribs and notices how chest expands when inhaling; contracts when exhaling.
6. Find pictures from magazines of things that produce odors; matches, bathroom spray, car & truck exhaust, flowers,
(Cont.)

II. Outside Resource and Community Activities

Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u></p> <p><u>Audio-Visual:</u></p> <p>6290 <u>Air Around Us</u>, color, 12 min. John Colburn, BAVI</p> <p><u>Filmstrips:</u></p> <p><u>Air Around Us</u></p> <p><u>Ocean of Air We Live In</u></p> <p><u>True Book of Your Body and You</u></p> <p><u>Community:</u></p> <p>Tour factory-smokestacks showing pollution Nurse or doctor Phy. Ed. teacher</p>	<p>I. (Cont.)</p> <p>barnyard manure, cooking f gasoline, charcoal with a bubble baths. Make a two-s a. Pleasant odors b. Unpleasant odors</p> <p>7. Physical exercises: walki running, galloping, tiptoe exercises use more energy</p>

Materials

Continued and Additional Suggested Learning Experiences

I. (Cont.)

barnyard manure, cooking foods like sauerkraut, gasoline, charcoal with a grill, perking coffee, bubble baths. Make a two-section chart:

- a. Pleasant odors
- b. Unpleasant odors

7. Physical exercises: walking, hopping, skipping, running, galloping, tiptoeing, sliding, etc. Faster exercises use more energy and child breathes oftener.

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C 6. Natural resources are not equally
 O distributed over the earth or over
 C time and greatly affect the geographic
 P conditions and quality of life.

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BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> Have the children illustrate 2 plants, 2 animals and playground equipment they would like in their own yard. Tell the teacher individually why they like growing things in their yard.</p> <p><u>Affective:</u> The teacher will ask, "How does fresh green grass make you feel? How does grey concrete make you feel?"</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Collect & compare colored pictures of attractive yards and of littered yards & vacant lots. Ask children where they would prefer to play. Discuss why & help them recognize that trash and litter spoil the appearance of a yard. Have the children think of places to dispose of litter: waste-baskets, trash cans, litter baskets in cars, garbage cans. 2. Examine these pictures for equipment & games, such as fireplace or grill, picnic tables, lounges, chairs, & balls, bats, play equipment, such as swing set. 3. Culminating activity - Make a mural of a yard. Include plants, animals, games & equipment they would like in their yard.
<p><u>Skills to be Learned</u></p> <ul style="list-style-type: none"> collect compare listening recall making a mural 	

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Problem Orientation Resources Grade K-1

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Collect & compare colored pictures of attractive yards and of littered yards & vacant lots. Ask children where they would prefer to play. Discuss why & help them recognize that trash and litter spoil the appearance of a yard. Have the children think of places to dispose of litter: waste-baskets, trash cans, litter baskets in cars, garbage cans.

2. Examine these pictures for equipment & games, such as fireplace or grill, picnic tables, lounges, chairs, & balls, bats, play equipment, such as swing set.

3. Culminating activity - Make a mural of a yard. Include plants, animals, games & equipment they would like in their yard.

II. Outside Resource and Community Activities

1. Take a class walk to a park or nearby yard (with owner's permission) and look for all the green growing things, as grass, shrubs, trees & plants, which make it more pleasant. (Note that green plants are the only living things in the whole world that make their own food.

2. Have children recall all the kinds of animal life observed in their yards, such as birds, insects, squirrels, chipmunks, rabbits, bees, earthworms (on sidewalks after rain or when digging up ground.) Note that some animals' homes are also found there.

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Materials	Continued and Additional Suggested Learning Experiences
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C 7. Factors such as facilitating transportation,
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 centers of population density.

BEHAVIORAL OBJECTIVES

Cognitive: The child will draw 4 types of transportation used around his city. Children may draw pictures of where their father works & how their family uses his paycheck.
Affective: Each child will use different modes of traveling (walk, run, car, bicycle, car, bus) to go over to see a friend. They will tell why they like this method.

Skills to be Learned
 Collecting pictures
 Discussions
 Community studies
 Comparisons

SUGGESTED LEARNING

I. Student-Centered in class activity

A. Classroom

1. Let's take a trip. How will we travel?
 - a. To go shopping in the nearest town?
 - b. To visit relatives 50 miles away?
 - c. To a strange & busy city such as New York or Chicago?
 - d. To Disneyland, if father only has one week of vacation?
 - e. To Japan?
 - f. To Washington Island from Gills Rock in northern Door County?
 - g. Other travel examples.
2. Children can plan a trip to a place they would like to visit.
 - a. List things they would need to pack in their own suitcases.
 - b. List things, besides clothing, the family would need for the trip. (food, cameras, bedding, spare tire, etc.)

(cont.)

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SUGGESTED LEARNING EXPERIENCES

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- I. Student-Centered in class activity
A. Classroom
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a. To go shopping in the nearest town?
b. To visit relatives 50 miles away?
c. To a strange & busy city such as New York or Chicago?
d. To Disneyland, if father only has one week of vacation?
e. To Japan?
f. To Washington Island from Gills Rock in northern Door County?
g. Other travel examples.
2. Children can plan a trip to a place they would like to vist.
a. List things they would need to pack in their own suitcases.
b. List things, besides clothing, the family would need for the trip. (food, cameras, bedding, spare tire, etc.)

(cont.)

- II. Outside Resource and Community Activities
A. Outside classroom
1. Find pictures of the different means of transportation, using magazines or newspapers. Paste these pictures on a mural & finish the scenery with crayon, craypas or paint.
2. Take a trip to the nearest town or city. Why do people live there? (Nearness to work, closer neighbors) How is the land used? (Homes, factories, stores, sidewalks, highways, lawn, gardens, trees, parks, etc.)
3. Count the number of steps to your friends house. How many minutes did the walk take? Could you travel there a faster way? If you took your bicycle, how long would it take?
4. Visit city park to

(cont.)

Resource and Reference Materials
Publications:

Audio-Visual:

Films:

Transportation: Footpath to Air
Lane, Color, 16 min., BAVI,
Churchill

Children at Work & Play Around
the World, B&W, 20 min., BAVI,
United World

America, the Beautiful, Color,
20 min., BAVI

Fishin' Fun In Wisconsin, Color,
free from Conservation Div.

The City, Color, 11 min., BAVI
EBF

Community:

Trip to motel or resort
Have parents show slides of
recent travel

Trip to town or city to study why
larger pop. than rural area

City park to see facilities
guided by recreation director

Continued and Additional Suggested

I. (cont.)

3. Children tell what they do w
time. Ask what their mom & dad
4. Write a class story about goi
they were pioneers. (Covered w
horse & buggy, walking, staged
it take longer to travel? How
care of the horse?
5. Class booklet, "My Daddy Goes
child draws his house, his fat
to work (tell mileage), the pl
his paycheck, where he spends
place he saves the money.
6. Talk about resort towns such
Why do people like to vacation
from the city, to do leisure t
boating, picnics, photography,
skiing, hiking, fishing) What
during winter, fall & spring?
7. Creative dramatics. Act out h
desirable for efficiency & aes
for tools & supplies, & also t
flowers & shrubbery, pruning,
cutting lawn, cleaning windows
inside of the house & garage.
8. Compare schools of today & lo
eight grades, within walking o
furniture, etc. Now--bus trans
room, audio-visual equipment,
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II. (cont.)

see facilities for young & old.
& backyards. Why are parks neces

erials	Continued and Additional Suggested Learning Experiences
<p>o Air I, ound BAVI, lor, Color, v. BAVI</p> <p>dy why ea s tor</p>	<p>I. (cont.)</p> <ol style="list-style-type: none"> 3. Children tell what they do with their leisure time. Ask what their mom & dad do for hobbies. 4. Write a class story about going on a trip if they were pioneers. (Covered wagons, horseback, horse & buggy, walking, stagecoach, etc.) Would it take longer to travel? How would you take care of the horse? 5. Class booklet, "My Daddy Goes to Work". Each child draws his house, his father traveling to work (tell mileage), the place he works at, his paycheck, where he spends the money & the place he saves the money. 6. Talk about resort towns such as Door County has. Why do people like to vacation there? (It is away from the city, to do leisure time activities--boating, picnics, photography, swimming, water skiing, hiking, fishing) What activities take place during winter, fall & spring? 7. Creative dramatics. Act out how homes are kept desirable for efficiency & aesthetics. (Takes money for tools & supplies, & also time): painting, planting flowers & shrubbery, pruning, working in garden, cutting lawn, cleaning windows, cleaning & straightening inside of the house & garage. 8. Compare schools of today & long ago. (Long ago--all eight grades, within walking distance of home, furniture, etc. Now--bus transportation, one grade per room, audio-visual equipment, furniture) Take tour of school building & audio-visual department. <p>II. (cont.)</p> <p>see facilities for young & old. Notice residential area & backyards. Why are parks necessary?</p>

ESEA Title III - 59-70-0135-1 Project I-C-E

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BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERI
<p><u>Cognitive:</u> Child can recite poems, sing songs, & tell about pictures of nature. He will take part in making a bulletin board of pupils having fun. He will share his rock collection with other children.</p> <p><u>Affective:</u> Playing out-of-doors is fun. Why?</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. List tree products in the classroom. 2. Point to things made of metal in room (coat hangers, window, silverware, door knob, chair, chalk, ring, etc.) <p>How do we use these products?</p> <ol style="list-style-type: none"> 3. Find pictures showing people who enjoy nature: picnicking, fishing, camping, boating, golfing, swimming, hiking, etc. 4. Paint a mural of children's ideas of having fun. 5. Make a list of ways in which rock is used in the natural state in the community. <p>II. Outs</p> <ol style="list-style-type: none"> 1. Ch 2. Tr <p>Comm rock a ro to a offe to s</p>
<p><u>Skills to be Learned</u></p> <p>Appreciation of literature Creative writing Make own rock collection Make bulletin board, "I Enjoy Nature."</p>	

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- I. Student-Centered in class activity
1. List tree products in the classroom.
 2. Point to things made of metal in room (coat hangers, window, silverware, door knob, chair, chalk, ring, etc.)
How do we use these products?
 3. Find pictures showing people who enjoy nature: picnicking, fishing, camping, boating, golfing, swimming, hiking, etc.
 4. Paint a mural of children's ideas of having fun.
 5. Make a list of ways in which rock is used in the natural state in the community.

- II. Outside Resource and Community Activities
1. Children like to collect rocks so let each child make a rock collection.
 2. Trip to local filling station to appreciate service he is offering so we can travel to see our country.

Resource and Reference Materials
Publications:

Books:

You and the Earth Beneath Us by
Julian May.
Rocks and Minerals by Lou Page.

Audio-Visual:

Films:

Treasures of the Earth, color,
11 min. BAVI
Minerals and Rocks, color, 13 min.
BAVI
Let's Take a Walk in the Woods,
color, 11 min., BAVI
Trees - How To Identify Them,
color, 11 min., BAVI
Your Friend the Forest - Save It
or Destroy It, color, 6 min.
BAVI

Community:

stone quarry
stone polisher
gas station

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Discipline Area Science
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 Problem Orientation Land Use

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> Through creative dramas, the child will choose various roles (such as trees, flowers, bulldozers, etc.) to show what happens when a wildlife area is disturbed. e.g. Trees, flowers, & animals homes are destroyed.</p> <p><u>Affective:</u> Children will tell voluntarily what is destroyed when a new road is built or a campfire is not taken care of & becomes a woods or forest fire.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> "Pick a Pretty Flower" bulletin board to show how many things can soon be destroyed. First admire the flowers. Then tell each child to go & pick one. Soon there's few left. This same thing happens when things of nature are destroyed. Diarama: Set up a forest of big & little trees. Use a child's toy payloador to up- root the trees to build several houses in their place. Houses may be shoebox homes. People come to live there but there are no trees. If a little for- sight is used, a few select trees should have been pre- served. Now it will take years to grow a tree of any size. Show pictures of factory smoke pollution & transportation vehicles. Make cartoons of what will happen to people. Air is polluted that some people have wear oxygen air masks or filters in order to breathe. Show red watery eyes with blurred (con-
<p><u>Skills to be Learned</u></p> <p>Diarama of destruction to a forest</p> <p>Dismantling of bulletin board destroys attractiveness</p> <p>Making pollution cartoons</p> <p>List machines man uses to make changes</p>	

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Problem Orientation Land Use Grade K-1

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Classroom

1. "Pick a Pretty Flower"
bulletin board to show how
many things can soon be
destroyed. First admire the
flowers. Then tell each
child to go & pick one.
Soon there's few left. This
same thing happens when
things of nature are destroyed.
2. Diarama: Set up a forest of
big & little trees. Use a
child's toy payloader to up-
root the trees to build several
houses in their place. Houses
may be shoebox homes. People
come to live there but there
are no trees. If a little fore-
sight is used, a few select
trees should have been pre-
served. Now it will take years
to grow a tree of any size.
3. Show pictures of factory smoke,
pollution & transportation
vehicles. Make cartoons of what
will happen to people. Air is so
polluted that some people have to
wear oxygen air masks or filters
in order to breathe. Show red,
watery eyes with blurred (cont.)

II. Outside Resource and
Community Activities

A. Out of class

1. Have agriculture
teacher or farmer
visit to tell how
he rotates his
crops. Also why
he fertilizes &
sprays some crops.
What machinery is
used to do these
jobs?
2. Find magazine
pictures of farm
machinery.
3. Visit highway
under construction
& watch man's
machinery. How
will the highway
help the community?
Does it harm a
natural area for
wildlife & plants?

Resource and Reference Materials	Continued and Additional Suggestions
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p> <u>The Little House</u>, Virginia Lee <u>Bates</u>, Houghton Mifflin, 1970 <u>Miguel's Mountain</u>, Bill Binzen, Coward-McCann </p> <p><u>Audio-Visual:</u></p> <p><u>Film:</u></p> <p> <u>Dairy Farm</u>, 2nd ed., Color, 14 min., Coronet, BAVI </p> <p><u>Teacher takes own slides:</u></p> <p> Farm land Farm machinery Housing development Factory pollution Highway construction </p> <p><u>Community:</u></p> <p> Farmer Agriculture teacher Housing development area Factory Highway construction </p>	<p>I. (cont.)</p> <p> vision. People will be coughing lung or heart disease & the elderly affected. </p>

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BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Child will know that if others do exactly what he does, noticeable changes will take place. If he does something good, more good will take place. Ex. tree planting. If bad, more bad will occur. Ex. littering.</p> <p><u>Affective:</u> The children will voluntarily pick up after himself in and outside of the classroom.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Litterbug Game - Each child finds something in his desk that he no longer wants. Go outside or remain in classroom. One child drops his unwanted item (litter) - the change is not too bad. But then have a few more go - then even one drop their litter. Next step: Clean up - put in trash can. (Encourage high school age or art class to design attractive litter containers.) 2. Litter Bug bulletin board. Draw outline of a huge bug. Children go on a "pick-up litter" walk. When they come back, glue litter found to "Litter Bug" bulletin board. 3. Make individual litter bags with slogans in art class. Use them for pick-up at school, then have them use them in their family car or elsewhere. (cont)
<p><u>Skills to be Learned</u></p> <p>Ways to help with litter problems</p> <p>Planting tree procedures</p> <p>Murals of results of a forest fire</p>	

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Problem Orientation Waste Disposal Grade K-1

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Litterbug Game - Each child finds something in his desk that he no longer wants. Go outside or remain in classroom. One child drops his unwanted item (litter) - the change is not too bad. But then have a few more go - then everyone drop their litter. Next step: Clean up - put in trash can. (Encourage high school ag or art class to design attractive litter containers.)
2. Litter Bug bulletin board. Draw outline of a huge bug. Children go on a "pick-up litter" walk. When they come back, glue litter found to "Litter Bug" bulletin board.
3. Make individual litter bags with slogans in art class. Use them for pick-up at school, then have them use them in their family car or elsewhere. (cont.)

II. Outside Resource and Community Activities

A. Outside classroom

1. Arbor Day - Have a tree planting ceremony at your school. Choose a protective, attractive area where it will add to the school's beauty. Give each child a seedling to plant at home. Tree will grow up with the child.
2. Take a nature walk.

Resource and Reference Materials

Publications:

Books:

Once There Was A Tree, Discovering Nature Series, Phyllis S. Busch, World Publishing

Patterns of Nature, Jeffrey Baker, Doubleday

Audio-Visual:

Films:

Garbage, CESA 9 Agency

Litterbug, Color, 10 min., Avis, BAVI

The Litterbug, Walt Disney, 8 min.

Forests, Color, 10 min., Gateway, BAVI

Your Friend the Forest, Save It or Destroy It, Color, 6 min. EBF, BAVI

Kit: Forest Fire Prevention & Conservation Kit (Contact Local Forester) State Forester
710 North Sixth Street
Milwaukee, Wis. 53202

Community:

Forest Ranger

Janitor

Nursery or Greenhouse

Continued and Additional Suggestions

I. (cont.)

4. Let the child who found the "a Day" or "Queen for a Day".
5. Tell janitor to not empty waste baskets. This will be similar to garbage. At the end of the week, analyze waste baskets. Was the paper it have been erased rather than new? Separate paper for recycling.
6. Have janitor show children waste from the waste baskets.
7. Murals: Forest Fires.
 - a. Draw what someone did throw matches, campfires left unattended.
 - b. Draw trees burning & wildlife fleeing forest homes.
 - c. Results of the fire: blackened trees, desperate to find a new home.
8. Read about "Smokey, the Bear" picture or write a short story.
9. Stress that wild flowers are enjoyed and not picked. Bulletin (Hayes Pub). Learn to recognize

Reference Materials	Continued and Additional Suggested Learning Experiences
<p>Tree, Discovering Phyllis S. Busch, e, Jeffrey Baker,</p> <p>gency 10 min., Avie, SAV</p> <p>lt Disney, 8 min. 0 min., Gateway,</p> <p>orest, Save It olor, 6 min. EBF,</p> <p>revention & (Contact Local Forester street 53202</p>	<p>I. (cont.)</p> <ol style="list-style-type: none"> 4. Let the child who found the most litter be "King for a Day" or "Queen for a Day". 5. Tell janitor to not empty waste baskets for one week. This will be similar to garbage pick-up once a week. At the end of the week, analyze the contents of the waste baskets. Was the paper really unusable & could it have been erased rather than wasting it and taking new? Separate paper for recycling. 6. Have janitor show children what he does with the waste from the waste baskets. 7. Murals: Forest Fires. <ol style="list-style-type: none"> a. Draw what someone did that started the fire: matches, campfires left unattended, cigarettes. b. Draw trees burning & wildlife fleeing from their forest homes. c. Results of the fire: blackened stumps & wildlife desperate to find a new home. 8. Read about "Smokey, the Bear". Let children draw his picture or write a short story. 9. Stress that wild flowers in the area should be enjoyed and not picked. Bulletin board, "Wild Flowers" (Hayes Pub). Learn to recognize.

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C 12. Private ownership must be re-
O
N garded as a stewardship and should
C
E not encroach upon or violate
P
T the individual right of others.

Discipline Area Sc

Subject Sc

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> By observation, the student will observe that negligence in caring for resources results in damage and destruction to those resources.</p> <p><u>Affective:</u> By his behavior in the classroom, the student will show his regard to the rights of others.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Show pictures of a shabby farm or house or factory. Ask children how they would improve its appearance. 2. Discuss reasons for a sidewalk. If everyone walks on grass, grass will die, and a path will be worn. 3. Child draws a picture. Another child then puts black marks on it. (Spoils picture and it distracts from its original beauty.)
<p><u>Skills to be Learned</u></p>	

wnership must be re-

tewardship and should

upon or violate

l right of others.

Discipline Area Science

Subject Science

Problem Orientation Land Use Grade K-1

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Show pictures of a shabby farm or house or factory. Ask children how they would improve its appearance.
2. Discuss reasons for a sidewalk. If everyone walks on grass, grass will die, and a path will be worn.
3. Child draws a picture. Another child then puts black marks on it. (Spoils picture and it distracts from its original beauty.)

II. Outside Resource and Community Activities

1. Talk a walk to look for "eyesores." Look at junkyard-so displeasing to the eye. What can be done? (dismantle and recycle glass and metal). A junkyard is not really pollution but is displeasing to the eye, thus the owner should screen it from view by a tall fence, use trees as a visual shield)
2. Show cow path in field or lane from machinery traveling.
3. Show factory smoke stacks polluting air and dumping waste products into water. (Results: dirty air making it difficult to breathe, discolored water, plants and fish die, algae on top of water, nobody can swim or fish or boat in it. Beauty is destroyed.)
4. Litterbugging makes picnic area, home, school, etc., look displeasing to the eye. Conduct litterbug clean-up walks.

Resources and Reference Materials
Publications

Continued and Additional Suggested

Audio-Visual:

Teacher should take own
slides:
shabby farms or houses
attractive homes
factories at work
junk yards
incinerators
picnic areas
paths worn by walking

Community

Take slides of community:
junkyard
dump area

Materials

Continued and Additional Suggested Learning Experiences

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish format. Please feel free to adapt it and add more pages. Let us and comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

For each episode used in your class, you may wish to duplicate this suggested form free to adapt it and add more pages. Let us know all your critiques, constructive and positive.

Objectives

Developed

Learning Experiences

Community Activities:

Source & Reference Materials
(Questions & comments)

ED055918

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 2

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338

Robert War
Robert Kel
George How

E INSTRUCTION - CURRICULUM - ENVIRONMENT

PROGRAM FOR ENVIRONMENTAL EDUCATION

Science GRADE 2

Title III E.S.E.A.

in CESA's 3-8-9
t
onsin 54301

Robert Warpinski, Director
Robert Keilner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is of over a hundred teachers, year long meetings, a summer workshop ecologists, this guide means realistic, developed aid for you. People which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are designed--to plug into existing, logical course content.
 2. Each page or episode offers suggestions. Since you know your to adapt, adopt, or use. By design, the range of suggestions mentation and usage are even wider. Many episodes are self-contained others can be changed in part or developed more keenly over a possibilities allow you to explore.
 3. Now we urge that you try the episodes and suggested learning plan. The reasons are simple. No guide has all the answers and unless viewed in the context of your classroom situation. Thus give it a triple reading, check over the resources listed, make prime your students, and seek help. The Project personnel and knowledge page stand ready to aid your efforts. Feel free
 4. The Project Resource Materials Center serves all CESA 3, 8, and private. We will send available materials pre-paid. Call for visit. Phone 432-4338.
 5. Check often the Project ICE Bibliography in your school library Center materials. Please offer suggestions, comments, or advice service may grow. Let's help each other.
 6. Involve yourself with the guide by reacting to it with scratch suggestions on the episode pages or use the attached evaluation collected in late May next year and will be used in our revision reactions and suggestions--negative and positive. Please note in the episodes may refer to specific, local community resource cases, individual school districts and teachers will have to substitutes. A list of terms pertinent to the episodes is below.
 7. Ecologists and other experts have simplified the issue--survival Creation's beauty and complexity--often noted as the work of and human energy to save. A year's work by a hundred of your gesture. Without you, their work will crumble, and so might we let us live to think, feel, and act in harmony with our world
- Edi
1. Cognitive means a measurable mental skill, ability, or process
 2. Affective refers to student attitudes, values, and feelings
 3. APWI means Acceptable Performance Will Include (labels a case)
 4. EPA - Environmental Problem Area

PREFACE

Students about their environment, help is ready. Thanks to the efforts of year long meetings, a summer workshop, university consultants and a realistic, developed aid for you. Please note the following ideas in writing and editing this guide. Every episode in nature and the episodes are designed--at appropriate instances, logical course content. We welcome suggestions. Since you know your students best, you decide what. By design, the range of suggestions is wide; your chances for experience are even wider. Many episodes are self-contained, others open-ended, still a part or developed more keenly over a few weeks. These built-in episodes are to explore. The episodes and suggested learning experiences but please pre-plan. No guide has all the answers and no curriculum will work in the context of your classroom situation. Thus, before trying an episode, check over the resources listed, make mental and actual notes, and seek help. The Project personnel and teachers listed on the acknowledgment are ready to aid your efforts. Feel free to ask their help in pre-planning. The Materials Center serves all CESA 3, 8, and 9 area schools--public and available materials pre-paid. Call for any help, materials, or to

ICE Bibliography in your school library for available Resource. We offer suggestions, comments, or advice--at any time--so that this help each other. Use the guide by reacting to it with scratch ideas, notes, and extended pages or use the attached evaluation format, which will be collected year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed are for specific, local community resources or conditions. In such districts and teachers will have to adopt local or available substitutes pertinent to the episodes is below. The efforts have simplified the issue--survival--yours, mine, our students, complexity--often noted as the work of a genius--will take our genius. A year's work by a hundred of your fellow teachers is a saving. Their work will crumble, and so might we all--literally. Instead, plan, and act in harmony with our world.

Editorial Board

Measurable mental skill, ability, or process based on factual data. Student attitudes, values, and feelings. Performance Will Include (labels a cognitive or mental performance.) Problem Area

ACKNOWLEDGEMENTS: The following teachers and consultants participated in the Supplementary Environmental Education G

CESA #3

Eugene Anderson, Peshtigo
 Laura Berken, Cconto Falls
 Willard Collins, Crivitz
 John Cowling, Niagara
 Nicholas Dal Santo, Pembine
 Robert Dickinson, Cconto
 Ann Fuhrmann, Marinette
 Lillian Goddard, Coleman
 William Harner, Iena
 Robert Herz, St. James (L)
 Ester Kaatz, Wausaukee
 Michael Kersten, Suring
 Douglas Koch, Cath. Central
 Donald Marsh, Bonduel
 David Miskulin, Goodman
 Don Olsen, Shawano
 Elmer Schabo, Niagara
 Marion Wagner, Gillett
 Ruth Ward, Crivitz
 George Kreiling, Marinette
 Marg. McCambridge, White Lake
 Virginia Pomusl, White Lake
 Gailen Braun, Lena
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 Lousene Benter, Gillett

CESA #8

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 David Bell, Neenah
 Marie Below, Clintonville
 William Bohne, Kimberly
 Bob Church, Little Chute
 Ronald Conradt, Shiocton
 Lee Halberg, Appleton
 Ronald Hammond, Hortonville
 Jerome Hennes, Little Chute
 Barbara Huth, Menasha
 Darrell Johnson, Hortonville
 Bernadyne King, Neenah
 Harold Lindhorst, St. Martin (L)
 John Little, Winneconne
 Gordon Rohloff, Oshkosh
 William Schaff, St. Joseph
 Doris Stehr, Mt. Calvary (L)
 Carolyn Shills, New London
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 Ron Schreier, Cmro

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 Thomas Weyers, Cathedral
 Ruth Windmuller, Green Bay
 James Wiza, DePere
 John Torgerson, Kewaunee
 Benjamin Roloff, Howard-Suamico
 Greg Schmitt, Cathedral
 John DeWan, Green Bay
 Emmajean Harmann, Sevastopol
 Ray Gantenbein, Green Bay
 David Bartz, Sturgeon Bay
 John Hussey, Green Bay
 Sister Barbara, St. Bernard

Ednajean Purcell, CSU
 David West, Lawrence U.

Robert Cook, UWGB
 Dennis Bryan, UWGB

C 1. Energy from the sun, the basic source

O
N of all energy, is converted through

Discipline Area Science

C
E plant photosynthesis into a form all

Subject

Science

P
T living things can use for life pro-

Problem Orientation

cesses.

BEHAVIORAL OBJECTIVES

Cognitive: The student will list names of living things which depend for their energy on a flow of materials from the sun; such as fresh-water plants, desert plants, woodland plants, field plants, seed plants and trees.

Affective: Students will recognize the fact that the sun is very important in their lives.

Skills to be learned

Identify various plant parts:

Roots

Stems

Leaves

Flowers

Observation of parts of plants

SUGGESTED LEARNING

I. Student-Centered in class activity

1. Children bring in well-washed can, cardboard cartons & frozen food packages for a display, "Plant parts we eat." Classify the exhibit to show foods from roots, stems, leaves, flowers, fruits and seeds.

2. Make a "Flower of the Week" collection. Every week, 2 children should show 6 wild flowers, make drawings and booklets identifying them as to the places they grow. Use books to identify them.

3. Identify 4 parts of any flower:
a. Sepals (outside part protecting bud)

b. Petals

c. Stamens (stalks with pollen boxes on top)

d. Pistil and seed box

4. Food from school menu- Student traces food back to a plant source. Ex.-meat-store-packing plant-farmer-pig-corn-plant.

the sun, the basic source

is converted through

thesis into a form all

can use for life processes.

Discipline Area Science-Springtime

Subject Science

Problem Orientation Energy use Grade 2

OBJECTIVES

student will
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plant parts:

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Children bring in well-washed can, cardboard cartons & frozen food packages for a display, "Plant parts we eat."

Classify the exhibit to show foods from roots, stems, leaves, flowers, fruits and seeds.

2. Make a "Flower of the Week" collection. Every week, 2 children should show 6 wild flowers, make drawings and booklets identifying them as to the places they grow. Use books to identify them.

3. Identify 4 parts of any flower:

- a. Sepals (outside part protecting bud)

- b. Petals

- c. Stamens (stalks with pollen boxes on top)

- d. Pistil and seed box

4. Food from school menu-

Student traces food back to a plant source. Ex.-meat-store-packing plant-farmer-pig-corn-plant.

II. Outside Resource and Community Activities

1. Take cuttings of willow, privet, forsythia, hedge shrubs, pinks, ivy and carnations. Plant in water or damp, sandy soil. Notice how roots form.

2. Search for plants without a stem (rosette of leaves, growing near ground, plants with round stems, square stems, triangular stems (found in wet ground), hairy stems, smooth stems, straight stems and branching stems.

3. Dig up a potato plant carefully so that the potatoes still hold on the plant (potato is an underground stem swollen with food).

4. Some stems are runners, Look for strawberry, creeping buttercup, daisy runners, etc.

5. Make a collection of leaf shapes. Notice smoothness, points,

(cont.)

Resource and Reference Materials
Publications:

Books:

Push and Pull; the story of
Energy by Paul Blackwood, 1966,
by McGraw-Hill, New York.

Energy, by Mitchel Wilson and
ed. of Time-Life, 1968 by Time-
Life Books, New York.

Audio-Visual:

Movie:

Foods from the Sun, G.B.
Instructional Media Center,
No. 4044 (Encyclopedia Britannica)
Planting Our Garden (Encyclopedia
Britannica)

How Sunshine Helps Us, Coronet
Food from the Sun (10 min.) EBF

BAVI

Filmstrips:

Photo-synthesis Seeds, Herbert
E. Budek, 1967

Plant Needs

How Plants Live

Parts of Plants

How Seeds Sprout and Grow Into
Plants

How Seeds are Scattered

Plants We Use, All from the
Encyclopedia Britannica

Community:

Conservation: FREE A picture
discussion kit-% Amer. Petroleum
Inst. 1271 Ave of Americas, N.Y.,
N. Y. 10020

Visit a green house or have a
florist speak to group.

Continued and Additional Suggested

II. (cont.)

number of leaflets, hair, p
cuts or teeth. Notice spec
foods, such as onion bulbs
middle and see the collect
of food.

6. Make a collection of climb
hooks, such as bramble, ivy

7. Make a collection of:

a. Ferns

b. Mosses

c. Fungi

d. Seaweeds

erials	Continued and Additional Suggested Learning Experiences
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II. (cont.)

number of leaflets, hair, points, stings, deep cuts or teeth. Notice special leaves for storing foods, such as onion bulbs. Cut onion down the middle and see the collection of fat leaves full of food.

6. Make a collection of climbing plants, which have hooks, such as bramble, ivy, etc.

7. Make a collection of:

- a. Ferns
- b. Mosses
- c. Fungi
- d. Seaweeds

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ESEA Title III - 59-70-0135-1 Project I-C-E

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E ing an intricate unit called an eco-
P
T system.

Discipline A
Subject
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BEHAVIORAL OBJECTIVES

SUGGESTED LE

Cognitive: Students will add crickets to their terraria and observe the effects the crickets have on grass and clover growth. They will also observe habits and characteristics of crickets.
Affective: Each group of two students will add several crickets, (at least two females) to their terrarium and will observe and record the effects of the crickets on the plants, at the same time observing the crickets as they live.

- I. Student-Centered in class activity
 1. Establish understanding of crickets (male-female) identification.
 2. Develop plan of introducing crickets to terrarium care of them (adding occasional fresh lettuce, uncerebral or grain, apple--avoid development of mold observations possible such change in number of plants and crickets, action of crickets.
 3. Allow students freedom making observations for or three periods. Share ideas.

Skills to be Developed

Observation
Maintaining a terrarium

organisms interact among

their environment, form-

te unit called an eco-

Discipline Area Science

Subject Animals

Problem Orientation Ecosystem Grade 2

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. Establish understanding of crickets (male-female) identification.
 2. Develop plan of introducing crickets to terrarium, care of them (adding occasional fresh lettuce, uncooked cereal or grain, apple--- avoid development of mold,) observations possible such as change in number of plants and crickets, action of crickets.
 3. Allow students freedom of making observations for two or three periods. Share ideas.

II. Outside Resource and
Community Activities

Resource and Reference Materials	Continued and Additional Suggest
<u>Publications:</u> Time - Life Series <u>Insect Life</u>	

erials

Continued and Additional Suggested Learning Experiences

C 2. All living organisms interact among
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 E forming an intricate unit called an
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 T ecosystem.

Discipline Area Science

Subject Science

Problem Orientation Eco

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Draw pictures of 4 food chains involving animals & their environments. Identify several food chains. Compare the habitats & food requirements of animals.
Affective: The children will continue to investigate the life cycle of various kinds of animals & their special environments.

Skills to be Learned
 Scientific investigation
 Record observations

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 - A. Class activities
 1. Diagram the different food chains on a chart.
 2. Learn the life cycles of a fish, turtle, frog, & other basic animals of land, air, & water by reading books, looking at movies, & observation.
Ex. Watch frogs grow from frog eggs into tadpoles, etc.
 3. Make a chart of living things that make their homes in a city or rural environment. Do areas of mammals, birds, insects & other tiny animals & plants.
 4. Report to the class on one forest animal & list its requirements for survival.

organisms interact among

their environment,

Discipline Area Science

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Subject Science

Problem Orientation Ecosystem Grade 2

OBJECTIVES

structures of
living
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food chains.
plants & food
animals.
Children will
investigate the
various kinds
of special

and
classification
systems

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Class activities

1. Diagram the different food chains on a chart.
2. Learn the life cycles of a fish, turtle, frog, & other basic animals of land, air, & water by reading books, looking at movies, & observation.
Ex.-Watch frogs grow from frog eggs into tadpoles, etc.
3. Make a chart of living things that make their homes in a city or rural environment. Do areas of mammals, birds, insects & other tiny animals & plants.
4. Report to the class on one forest animal & list its requirements for survival.

II. Outside Resource and
Community Activities

- A. Take a field trip to a local nature center, zoo, marsh, pond, City Outdoor Ed. Center, Green Bay, Baird Creek.
- B. Invite a pet shop owner, conservationist, or biology teacher to give a talk.

Resource and Reference Materials
Publications:

Continued and Additional Sugg.

Books:

Children of the Ark by Robert
Gray
You and the World Around You by
Millicent E. Selsom
Farewell to Shady Glade by Wm.
Peat
The Wump World by Wm. Peat
The Barn by Shoenheer

Audio-Visual:

Movies:

Animal Communities and Groups,
No. 4007, Green Bay Instructional
Media Center, Coronet.
Common Animals of the Woods,
No. 4017, Green Bay Instructional
Media Center (Encyclopedia
Britannica).
Living Things are Everywhere,
No. 4086, Green Bay Instructional
Media Center (Encyclopedia
Britannica).
We Get Food from Plants & Animals,
McGraw-Hill Publishing Co.,
Text Film Dept., 330 W. 42nd St.,
New York, N.Y. 10036.

Community:

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Continued and Additional Suggested Learning Experiences

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30 W. 42nd St.,
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C 3. Environmental factors are limiting
 O
 N on the numbers of organisms living
 C
 E within their influence, thus, each
 P
 T environment has a carrying capacity.

Discipline Area _____
 Subject _____
 Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> List or draw three small animals helpful to man. Identify 4 factors that help to limit number of animals in their environment.</p> <p><u>Affective:</u> Children will now know that animals need to struggle to live.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Discussion of diseases by children 2. Friends in garden pictured 3. Make safety posters on preventing forest fires; water safety. 4. Natural hazards of foods, tornadoes, earthquakes collected from newspapers & magazines. 5. Write letter to local Forest Ranger Station for information
<p><u>Skills to be Learned</u></p> <ul style="list-style-type: none"> Collections Recording data Contributions for discussions Letter writing 	

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s of organisms living

Discipline Area

Science

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Subject

Science

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Problem Orientation

Animals e

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OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. Discussion of diseases by children
 2. Friends in garden pictured
 3. Make safety posters on preventing forest fires; water safety.
 4. Natural hazards of foods, tornadoes, earthquakes collected from newspapers & magazines.
 5. Write letter to local Forest Ranger Station for information

- II. Outside Resource and Community Activities
 1. Veterinarian visit class and tell general diseases found in wild animals.
 2. Collect bugs & small animals in jars; discuss useful & harmful types. Release useful in natural environment. Helpful - ladybugs, spiders, bees, dragon flies

Resource and Reference Materials	Continued and Additional Suggeste
<p><u>Publications:</u> <u>Ranger Rick</u> articles, published National Wildlife Federation. Forest Fires Earthquakes Glaciers Water Pollution or lack of water December, 1970 & March, 1971 Grade Teacher - January, 1969</p> <p><u>Audio-Visual:</u> <u>Films:</u> <u>How Animals Live in Winter</u>, IMC F-9-D11 <u>Insects In The Garden</u>, IMC Pub. Ency. Brit. Films F-455 11 min. <u>How Animals Defend Themselves</u>, 8 min. YA Pub., BAVI 0975</p> <p><u>Community:</u> Trip to wooded area - find animal homes Forest ranger visit to talk about forest fires Behm Game Farm - wild animal farm near Antigo Veterinarian visit</p>	

s	Continued and Additional Suggested Learning Experiences
er	

C 4. An adequate supply of pure
O
N water is essential for life.
C
E
P
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Discipline Area _____ S
Subject _____ S
Problem Orientation _____ W

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: After obser-
vation of pure and im-
pure water, the student
will identify water
pollutants & how to
eliminate them.
Affective: Through
teacher-stimulated
discussion, the students
will ask questions or
volunteer information
regarding local pollution
of water.

Skills to be Learned
Scientific investi-
gation
Record
Observe results
Make assumptions & write
a definition

- I. Student-Centered in class activity
1. Prepare a display of dif-
ferent types of water con-
taminators.
a. salt, sugar, food color-
ing, fertilizer, oil,
detergent, soil, etc.
 2. Two groups labeled "Clean
Environment" and "Polluted
Environment." The "We Care"
group changes water in one
fish bowl with 2 fish, feed
fish regularly, & keep
environment clean. The "We
Don't Care" group keeps a
record of the elements,
such as dirty nail, dust,
mud, dead leaf, chicken bone,
detergent suds, gum intro-
duced in other fish bowl
with 2 fish. Observe murki-
ness, foul air, lethargic
fish, eventual death of
fish.
- II

ESEA Title III - 59-70-0135-1 Project I-C-E

Materials

Continued and Additional Suggested Learning Experiences

e, Ch. 49
BSCS

of the
Environmental

C 11. Individual acts, duplicated
 O
 N or compounded, produce significant
 C
 E environmental alterations over time.
 P
 T

Discipline Area Science
 Subject Biology
 Problem Orientation Biological

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Students will describe several examples of biological amplification of pesticides encountered in a review of source literature & relate this to pesticide half-life.
Affective: Students will express concern over individual contributions to pesticide pollution by suggesting measures that will guide individual decisions on pesticide use in agreement with ecological principles.

Skills to be Learned

Observation
 Data recording
 Data analysis
 Correlation of written research & direct lab observation
 Application to real world problems

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 - A. Class
 1. Review with class the concept of a food chain.
 2. Student lab work in teams of 3 - 5. Set up a controlled artificial pond experiment.
 - a. In a glass jar exposed to daylight introduce a culture of planktonic algae in a balanced nutrient solution.
 - b. After a week approximately, make a cell count with a plankton counting chamber.
 - c. Introduce a known population of Daphnia or other zooplankters. Make daily cell counts over a week's time.
 - d. Introduce a small minnow type fish in the jar. Take care to adequately aerate. After a day or so count the zooplankters.
 3. Discuss the food pyramid concept & its implications as exemplified by the experimental results summarized for the class as a whole.
 4. Students read short selections on the principles of biological amplification or delayed (cont.

uplicated

significant

tions over time.

Discipline Area Science

Subject Biology

Problem Orientation Biological
Magnification Grade 10

VES	SUGGESTED LEARNING EXPERIENCES	
ll es tion ed s to ll s to t use	<p>I. Student-Centered in class activity</p> <p>A. Class</p> <ol style="list-style-type: none">1. Review with class the concept of a food chain.2. Student lab work in teams of 3 - 5. Set up a controlled artificial pond experiment.<ol style="list-style-type: none">a. In a glass jar exposed to daylight introduce a culture of planktonic algae in a balanced nutrient solution.b. After a week approximately, make a cell count with a plankton counting chamber.c. Introduce a known population of <u>Daphnia</u> or other zooplankters. Make daily cell counts over a week's time.d. Introduce a small minnow type fish in the jar. Take care to adequately aerate. After a day or so count the zooplankters.3. Discuss the food pyramid concept & its implications as exemplified by the experimental results summarized for the class as a whole.4. Students read short selections on the principles of biological amplification or delayed (cont.)	<p>II. Outside Resource and Community Activities</p> <p>A. Out of class</p> <ol style="list-style-type: none">1. Investigate the types of pesticides sold in local stores for effective chemical formulation. Check available literature for reference to break down time & biological concentration-ability of most commonly used insecticides and herbicides.

orld

Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u></p> <p><u>Pesticides and the Living Landscape,</u> Robert Rudd, U. Wis. Press</p> <p><u>Cleaning Our Environment: The</u> <u>Chemical Basis for Action,</u> American Chemical Society</p> <p><u>Mans Impact on Environment,</u> Thomas Detwyle, McGraw-Hill</p> <p><u>Silent Spring,</u> Rachel Carson</p> <p><u>Science</u> - appropriate article</p> <p><u>Bioscience</u> - appropriate articles</p>	<p>I. (cont.)</p> <p>expression known to occur concentrated in the food of the relationship between of fat tissue.</p> <p>5. Apply the correlation obtained of numbers & biological amount as source of pesticide concentration guided discussion, the role of operator, municipality, and the availability of pesticide whole.</p> <p>6. Students suggest ways indicated guided to be in agreement with operation stability.</p>
<p><u>Audio-Visual:</u></p> <p><u>Community:</u></p> <p><u>Local</u></p> <p>pond & pools with algae & Daphnia populations</p>	

Materials	Continued and Additional Suggested Learning Experiences
<p>Landscape, SS The n, y t, ill son icle articles</p>	<p>I. (cont.)</p> <p>expression known to occur as pesticides are concentrated in the food chain terminals. Discuss the relationship between chlorinated pesticides & fat tissue.</p> <p>5. Apply the correlation obtained between the pyramid of numbers & biological amplification to man's role as source of pesticide contamination. Emphasize in guided discussion, the role of individual farm operator, municipality, and corporation in compounding the availability of pesticide to the biosphere as a whole.</p> <p>6. Students suggest ways individual decisions can be guided to be in agreement with the whole ecosystem operation stability.</p>

C 12. Private ownership must be
 O
 N regarded as a stewardship and
 C
 E should not encroach upon or violate
 P
 T the individual right of others.

Discipline Area Science
 Subject Biology
 Problem Orientation Conceptual

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> The student will study the effects of animal activities on water infiltration & run-off of compacted soil.</p> <p><u>Affective:</u> Upon completion of this investigation, the student will question the use of various agricultural practices which tend to decrease the rate of water infiltration, & subsequent increased run-off.</p>	<p>I. Student-Centered in class activity</p> <p><u>General Rationale</u></p> <p>The grazing of domestic animals in an enclosed area of native vegetation often brings about great changes in species composition of the communities present. These changes include destruction of many of the original plants, the introduction of many plants not members of the undisturbed community, and a number of changes in the soil of the grazed area. The soil change which is most pronounced is that resulting from compaction by the animals' hooves. This results in a greatly reduced rate of infiltration of rain water & a consequent increase of run-off.</p>
<p><u>Skills to be Learned</u></p> <p>Observation Experimentation Control (experimental) Comparison Gathering data Presenting data</p>	

ship must be _____
 ardship and _____ Discipline Area Science
 h upon or violate _____ Subject Biology
 ht of others. _____ Problem Orientation Conservation Grade 10

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
dent ets s on & d on ces ase d	I. Student-Centered in class activity <u>General Rationale</u> The grazing of domestic animals in an enclosed area of native vegetation often brings about great changes in species composition of the communities present. These changes include destruction of many of the original plants, the introduction of many plants not members of the undisturbed community, and a number of changes in the soil of the grazed area. The soil change which is most pronounced is that resulting from compaction by the animals' hooves. This results in a greatly reduced rate of infiltration of rain water & a consequent increase of run-off.	II. Outside Resource and Community Activities A. Class project 1. Soil compactness may be measured with fairly sophisticated equipment such as a Wilde Permeater. Less sophisticated equipment is adequate for the purpose of this investigation. The student will first remove both ends of a small frozen juice can. Insert the can 2 inches into the soil. Pour in 50 ml. of water into the can & record the length of time required for the water to enter the soil. Study a pair of communities one grazed, one ungrazed. A school playlot vs a lawn may be used. Measure the water infiltration rate in the two sites. Submit a brief summary of your observations.
d d tal)		

Resource and Reference Materials
Publications:

E. C. Steinbrenner

Effects of grazing on floristic
composition & soil properties of
farm woodland in southern Wis.
Journal Forestry 49:906-910. 1951

Audio-Visual:

Community:

Local farmer

Soil Conservation Board Rep.

Continued and Additional

Source Materials

Continued and Additional Suggested Learning Experiences

on floristic
properties of
Southern Wis.
9:906-910. 1951

ard Rep.

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish to use the following format. Please feel free to adapt it and add more pages. Let us hear your comments - negative and positive.

I. Behavioral Objectives A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

on each episode used in your class, you may wish to duplicate this suggested
feel free to adapt it and add more pages. Let us know all your critiques and
tive and positive.

Objectives
ve:

ve:

veloped

Learning Experiences
s:

& Community Activities:

Resource & Reference Materials
uggestions & comments)

ED055918

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENTAL

PLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 11

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
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Robert W
Robert K
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E INSTRUCTION - CURRICULUM - ENVIRONMENT

PROGRAM FOR ENVIRONMENTAL EDUCATION

Science GRADE 11

Title III E.S.E.A.

in CESA's 3-8-9

t
onsin 54301

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help of over a hundred teachers, year long meetings, a summer workshop for ecologists, this guide means realistic, developed aid for you which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are designed to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know how to adapt, adopt, or use. Be design, the range of suggestion and usage are even wider. Many episodes are so designed that others can be changed in part or developed more keenly and possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning plan. The reasons are simple. No guide has all the answers unless viewed in the context of your classroom situation. Give it a triple reading, check over the resources listed, prime your students, and seek help. The Project personnel knowledge page stand ready to aid your efforts. Feel free to write.
4. The Project Resource Materials Center serves all CESA 3, private. We will send available materials pre-paid. Call for a visit. Phone 432-4338.
5. Check often the Project Resource Materials Center in your school. Please send suggestions, comments, or requests. Service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with suggestions on the episode pages or use the attached evaluation form collected in late May next year and will be used in our review. Reactions and suggestions--negative and positive. Please note that in the episodes may refer to specific, local community resources, individual school districts and teachers will have substitutes. A list of terms pertinent to the episodes is included.
7. Ecologists and other experts have simplified the issue--the Creation's beauty and complexity--often noted as the work of a year's energy to save. A year's work by a hundred of people. Without you, their work will crumble, and so must we let us live to think, feel, and act in harmony with our world.

1. Cognitive means a measurable mental skill, ability, or knowledge.
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels).
4. EPA - Environmental Problem Area.

PREFACE

excite students about their environment, help is ready. Thanks to the efforts of teachers, year long meetings, a summer workshop, university consultants and this guide means realistic, developed aid for you. Please note the following ideas and teachers in writing and editing this guide. Supplementary in nature and the episodes are designed--at appropriate instances--to existing, logical course content. Each episode offers suggestions. Since you know your students best, you decide what to use, or use. Be design, the range of suggestions is wide; your chances for experience are even wider. Many episodes are self-contained, others open-ended, still changed in part or developed more keenly over a few weeks. These built-in allow you to explore. At you try the episodes and suggested learning experiences but please pre-pare questions are simple. No guide has all the answers and no curriculum will work in the context of your classroom situation. Thus, before trying an episode, do the reading, check over the resources listed, make mental and actual notes, ask questions, and seek help. The Project personnel and teachers listed on the acknowledgment stand ready to aid your efforts. Feel free to ask their help in pre-planning. The Resource Materials Center serves all CESA 3, 8, and 9 area schools--public and private. We will send available materials pre-paid. Call for any help, materials, or to 32-4338.

Project ICE Bibliography in your school library for available Resources. Please offer suggestions, comments, or advice--at any time--so that this work will help each other. Work with the guide by reacting to it with scratch ideas, notes, and extended use of the episode pages or use the attached evaluation format, which will be collected May next year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed may refer to specific, local community resources or conditions. In such cases, your school districts and teachers will have to adopt local or available substitutes of terms pertinent to the episodes is below. Other experts have simplified the issue--survival--yours, mine, our students, the complexity--often noted as the work of a genius--will take our genius to save. A year's work by a hundred of your fellow teachers is a saving grace for you, their work will crumble, and so might we all--literally. Instead, think, feel, and act in harmony with our world.

Editorial Board

measures a measurable mental skill, ability, or process based on factual data. Refers to student attitudes, values, and feelings. Acceptable Performance Will Include (labels a cognitive or mental performance.) Problem Area.

ACKNOWLEDGEMENTS: The following teachers and consultants p
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C O N C E P T	1. <u>Energy from the sun, the basic</u> <u>source of all energy, is converted through</u> <u>plant photosynthesis into a form all</u> <u>living things can use for life processes.</u>	Discipline Subject Problem Or
---------------------------------	--	---

BEHAVIORAL OBJECTIVES	SUGGESTED
<p><u>Cognitive:</u> To know that there is particulate matter in the air and to identify the more obvious sources in the community.</p> <p><u>Affective:</u> By readings, discussion and activities, students will be made aware of the quantitative and qualitative contribution of local sources of particulate matter and actively support efforts to limit the amount.</p>	<p>I. Student-Centered in class activity</p> <p>1. "Chemistry Magazines" idea of air evaluation and tests should be discussed in class after assigning it as reading.</p> <p>2. Using a vacuum pump students can use a canister filter to show particulate materials in the air.</p> <p>3. By using the vacuum pump which has a specified volume per second, after running the pump for several hours, then weigh the particulate on an analytical balance, the amount of particulate matter per cubic yard can be calculated.</p>
<p style="text-align: center;"><u>Skills to be Learned</u></p> <p>Researching from scientific journals</p> <p>Technique for a millipore filtration or particulate study</p> <p>Formulating evidence from studies and organizing it to form a regularity.</p>	

from the sun, the basic

energy, is converted through

synthesis into a form all

can use for life processes.

Discipline Area

Subject

Problem Orientation Air Pollution

Science

Chemistry

Grade 11

OBJECTIVES

know that there
matter in the
ify the
forces in the
adings, dis-
vition, stu-
de aware of
and quali-
ion of local
culate
ely support
the amount.

earned

m scientific

millipore
rticulate

vidence from
nizing it
rity.

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. "Chemistry Magazines" idea of air evaluation and tests should be discussed in class after assigning it as reading.
 2. Using a vacuum pump, students can use a carbon filter to show particulate materials in the air.
 3. By using the vacuum pump which has a specified volume per second, and running the pump for several hours, then weighing the particulate on an analytical balance, the amount of particulate matter per cubic yard can be calculated.

- II. Outside Resource and Community Activities
 1. Researching and journals in chemistry may lead to a prediction of future pollution based on studies in existence.
 2. Sample air in various areas within a locality and noting the possible sources of particulate matter within each locality.

Resource and Reference Materials	Continued and Additional Suggested Learning Activities
<p><u>Publications:</u></p> <ul style="list-style-type: none"> "Chemistry" magazine "National Wildlife" magazine "The E.Q. Index" "Ecology" magazine <p><u>Audio-Visual:</u></p> <ul style="list-style-type: none"> #6576-6777 "Poisoned Air" (BAVI) <p><u>Community:</u></p> <ul style="list-style-type: none"> Local Chemical Engineer - give a talk, answer student questions Local air pollution official- visit to the classroom 	

ls	Continued and Additional Suggested Learning Experiences
----	---

I)

C 2. All living organisms interact among
 O themselves and their environment,
 N
 C forming an intricate unit called an
 E
 P ecosystem.
 T

Discipline Area

Subject

Problem Orientation

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: By studying the properties of nitrogen & phosphorous compounds in the context of agricultural applications, the students will discover the inter-relatedness of chemical & biotic elements in living systems.
Affective: By investigating the role of biotic agents in carrying on chemical transfers necessary for use by other organisms, the students will gain an appreciation for the complex nature of a balanced soil ecosystem.

Skills to be Learned

Independent investigation
 Correlation of varied areas of science
 Oxidation state computations

SUGGESTED L

- I. Student-Centered in class activity
 - A. Group V A elements: The cyclic nature of nutrient element movement in an organism-environment interaction provides an opportunity to study the chemical of nitrogen, phosphorus, their common compounds, setting of application, the problem of chemical limiting factors in the biotic community.
 1. While discussing the properties of ammonium, nitrogen oxide ions, introduce the fundamental organism-ion relationship of the ammonifiers, nitrifiers, & the nitrogen fixing bacteria, etc. the concept of ion availability to plants & the concept that some organisms can obtain energy by oxidizing with nitrogen.
 2. Variation in the oxidation state of nitrogen from +3 to +5 can be followed in the biological chain of conversion of ammonium.

organisms interact among

their environment,

Discipline Area Science

locate unit called an

Subject Chemistry

Ecosystem

Problem Orientation Complexity Grade 11

OBJECTIVES

Studying
nitrogen
compounds in
agricultural
students
inter-
chemical &
in living

Investigating
chemical agents in
chemical transfers
by other
students will
contribute to the
understanding of a balanced

Identified
investigation
in agricultural areas
computations

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 - A. Group V A elements: The cyclic nature of nutrient element movement in an organism-environment interaction provides an opportunity to study the chemical aspects of nitrogen, phosphorous, & their common compounds in a setting of application to the problem of chemical limiting factors in the biotic community.
 1. While discussing the properties of ammonia & the nitrogen oxide ions, introduce the fundamental organism-ion relationships of the ammonifiers, the nitrifiers, & the nitrogen fixing bacteria, etc. Note the concept of ion availability to plants & the concept that some organisms can obtain energy by oxidizing with nitrogen.
 2. Variation in the oxidation state of nitrogen from -3 to +5 can be followed thru the biological chain of conversion of ammonia (cont.)

II. Outside Resource and Community Activities

Resource and Reference Materials	Continued and Additional Suggested Learning
<p><u>Publications:</u> <u>The Nature & Properties of Soil</u>, Buckman & Brady-MacMillan Other texts on soils & soil chemistry or soil bacteriology <u>Discoveries in Nitrogen Fixation</u>, 1953, M. D. Kamen, Sci American Recent articles on soil science <u>Foundations of Chemistry</u>, Toon, Ellis & Brodtkin, Holt, Rinehart & Winston</p> <p><u>Audio-Visual:</u> <u>Films:</u> <u>Nitric Acid</u>, BAVI, #6926, \$4.75, (Modern learning aids) <u>Nitric Acid Compounds & the</u> <u>Nitrogen Cycle</u>, BAVI, #4767, \$6.75, Coronet <u>Nitrogen and Ammonia</u>, BAVI, #4766, \$5.50, Coronet</p> <p><u>Community:</u> Feed & fertilizer dealer Univ. Wis. Ext. Agronomist in County Agent's Office UW Agri. Experiment Station UWGB: CES Dr. Thomas MacIntosh Dr. Herb Huddleston</p>	<p>I. (cont.) to nitrate. 3. Students research the applications process. 4. Students investigate the topic of r by legumes and other nitrogen fixing 5. Students investigate the soil parti of the nutrient minerals and relate spacial qualities of clay particles availability to plants & soil organi 6. Students investigate the factor of the calcium phosphates, and the sulf process for forming superphosphate. 7. Students investigate the relationsh and phosphate availability to plants</p>

Materials	Continued and Additional Suggested Learning Experiences
<p>of Soil, an oil riology <u>Fixation</u>, American science , Toon, Rinehart</p> <p>6, \$4.75,</p> <p>the #4767,</p> <p>AVI, #4766,</p> <p>st in</p> <p>ion</p> <p>sh</p> <p>n</p>	<p>I. (cont.)</p> <p>to nitrate.</p> <p>3. Students research the applications of the Haber process.</p> <p>4. Students investigate the topic of nitrogen fixation by legumes and other nitrogen fixing organisms.</p> <p>5. Students investigate the soil particle-ion affinities of the nutrient minerals and relate the electrical & spacial qualities of clay particles to nutrient availability to plants & soil organisms.</p> <p>6. Students investigate the factor of solubility of the calcium phosphates, and the sulfuric acid process for forming superphosphate.</p> <p>7. Students investigate the relationship between pH and phosphate availability to plants.</p>

3. Environmental factors are limiting
the numbers of organisms living with-
in their influence. thus, each environ-
ment has a carrying capacity.

Discipli-

Subject

Problem

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGEST
<p><u>Cognitive: The student will set up an aquarium and test the water for dissolved solids to illustrate carrying capacity for life of a certain volume of water.</u></p> <p><u>Affective: Student will indicate in written report that man can have great and sudden impact on a population and should therefore weigh actions very carefully.</u></p>	<p>1. Student-Centered class activity</p> <p>1. <u>Concept of the M</u> <u>Discussion of diss</u> <u>materials in water</u> <u>of over toxifying</u> <u>by over-carrying c</u> <u>of areas-what over</u> <u>lation can do.</u></p> <p>2. Set up small aqu with distilled water three goldfish.</p> <p>a) Test water at c</p> <p>b) After fish have aquarium four days water for phosphat nitrates, chloride</p> <p>c) Drain aquarium in fresh water with fish.</p> <p>d) Test at end of</p> <p>e) Fish may have d from high concentr of toxic substance</p> <p>f) Have students g results.</p> <p>3. Discussion of bi demands of organis</p>
<p><u>Skills to be Learned</u></p> <p>Setting up an aquarium</p> <p>Conducting tests</p> <p>Designing an experiment</p> <p>Graphing results-number of individuals vs. waste materials</p> <p>Researching and rewriting biochemical data</p> <p>Establishing conclusions</p>	

mental factors are limiting
 bers of organisms living with-
 fluence, thus, each environ-
 carrying capacity.

Discipline Area Science
 Subject Chemistry
 Problem Orientation Carrying capacity Grade 11

GENERAL OBJECTIVES

The student will set
 up and test the
 dissolved solids
 carrying capacity
 a certain vol-

The student will indi-
 cated report that
 great and sudden
 population and
 fore weigh
 carefully.

Learned
 an aquarium
 tests
 an experiment
 results-number of
 vs. waste ma-

and rewriting
 data
 conclusions

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. Concept of the Minimum-Discussion of dissolved materials in water-affects of over toxifying water by over-carrying capacities of areas-what over population can do.
 2. Set up small aquarium with distilled water and three goldfish.
 - a) Test water at outset.
 - b) After fish have been in aquarium four days, test water for phosphates, nitrates, chlorides, oxygen.
 - c) Drain aquarium and put in fresh water with six fish.
 - d) Test at end of 4 days.
 - e) Fish may have died from high concentration of toxic substances.
 - f) Have students graph results.
 3. Discussion of bio-chemi- demands of organism.

- II. Outside Resource and Community Activities
 1. Guest Speaker- D.N.R. (Deer over-population, fox, etc.
 2. Have students choose any plant or animal and write reports describing the limitations that other organisms place on the population of their choice. What would happen if over-population would occur in the plant or animal of their choice? Explain man's role in the population of another species. Written reports can be submitted for local school newspaper use or local community newspaper use.

als	Continued and Additional Suggested Learning Experiences
<p>Water"</p> <p>oc.</p> <p>sion,</p> <p>fe,</p>	

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4. An adequate supply of pure water is essential for life.

Discipline Area Science

Subject Advanced

Problem Orientation Water

BEHAVIORAL OBJECTIVES

Cognitive: Given a general format for construction, students will construct a model and will manipulate conditions in an effort to record, analyze, report, and exhibit effects of these manipulations on the stream life.

Affective: Students will participate in local stream improvement or defend the stream against undesirable intrusions.

Skills to be Learned

Research, sampling, and constructing skills
Data collecting
Data analysis

SUGGESTED LEARNING EXPERIENCES

- | | |
|--|-----------------------------------|
| <p>I. Student-Centered in class activities</p> <ol style="list-style-type: none"> 1. Interdisciplinary project: Construction of a simulated stream with continuously recycled water. <ol style="list-style-type: none"> a. Involve wood shop in construction of frame. b. Involve metals shop in construction of watertight streambed c. Physical sciences to construct pumping systems. d. Art to work on stream bed and stream side (Esthetics) e. Biology to introduce variety of stream organisms. f. Math department may calculate velocity, flow, etc. | <p>II. •</p> <p>C. 1</p> <p>2</p> |
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Supply of pure

1 for life.

Discipline Area Science

Subject Advanced Biology

Problem Orientation Water Grade 11-12

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activities
1. Interdisciplinary project:
Construction of a simulated stream with continuously recycled water.
 - a. Involve wood shop in construction of frame.
 - b. Involve metals shop in construction of watertight streambed
 - c. Physical sciences to construct pumping systems.
 - d. Art to work on stream bed and stream side (Esthetics)
 - e. Biology to introduce variety of stream organisms.
 - f. Math department may calculate velocity, flow, etc.

- II. Outside Resource and Community Activities
1. Sampling of various stream types on determination of natural species distribution
 2. If a stream is located near enough, the students can apply their learned techniques in stream improvement with permission of proper government authority.

Resource and Reference Materials

Publications:

Fresh-Water Biology, Needham and
Needham.

Key to Fresh-Water Animals of the
North Central States by Samuel
Eddy.

Readings in Conservation Ecology,
Cox.

Audio-Visual:

Community:

Continued and Additional Suggested Learning

als	Continued and Additional Suggested Learning Experiences
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C 5. An adequate supply of clean air is

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N essential because most organisms

Discipline Area _____

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E depend on oxygen, through respiration,

Subject _____

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T to release the energy in their food.

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: Using an eudiometer (gas measuring tube), the students will perform an experiment designed to show the percentages of oxygen & carbon dioxide in the air, along with the importance of maintaining such an atmospheric level. Affective: Using this experiment, students gain an understanding of gas volumes & their relationships to temperature & pressure; the techniques involved in measuring gas volume by water displacement. This experiment can show graphically the related amount of gases in the atmosphere. Samples could be collected from various locations to compare percentages. Metropolitan areas will show a slightly higher CO₂ level and a slightly lower O₂ level.

Skills to be Learned

Technique in experimentation
displacement technique.

Setting up an experiment. (Cont.)

SUGGESTED LEARNING

- I. Student-Centered in class activity
 1. Read & research theoretical percentages of gases in air.
 2. Set up experiment for determination of oxygen % in air: Chemicals include: pyrogallol acid, sodium hydroxide, distilled H₂O. Apparatus includes: pan, eudiometer, evaporating dish. (Experiments in Semi-Micro Chemistry)
 3. Perform experiment for O₂ & then repeat for CO₂. Note for CO₂: The Analysis of Air Pollutants by W. Leithe, 1970, Ann Arbor-Humphrey Science Publishers, Ann Arbor, Mich.
 4. Have students compare data (4 or 5 separate experiments should provide a good reliable average.)
 5. Using technical figures, students can interact their results & compare them.

Supply of clean air is

most organisms Discipline Area Science
through respiration, Subject Chemistry
energy in their food. Problem Orientation Clean Air Grade 11

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
In eudio- (g tube), perform igned to es of oxide in n the aining e level. This s gain t gas lation- ce & niques ing gas splace- ent can ne re- ses in mples from to com- Metropo- how a 2 level er O ₂	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none">1. Read & research theoretical percentages of gases in air.2. Set up experiment for determination of oxygen % in air: Chemicals include: pyrogalllic acid, sodium hydroxide, distilled H₂O. Apparatus includes: pan, eudiometer, evaporating dish. (Experiments in Semi-Micro Chemistry)3. Perform experiment for O₂ & then repeat for CO₂. Note for CO₂: The Analysis of Air Pollutants by W. Leithe, 1970, Ann Arbor-Humphrey Science Publishers, Ann Arbor, Mich.4. Have students compare data (4 or 5 separate experiments should provide a good reliable average.)5. Using technical figures, students can interact their results & compare them.	<p>II. Outside Resource and Community Activities</p>
ed rimentation ique. eriment. (Cont.)		

Resource and Reference Materials
Publications:

Experiments in Semi-Micro Chemistry,
1968 edition, Metcalfe, Williams,
Castka, Holt, Rinehart & Winston.
Modern Chemistry - Handbook of
Chemistry and Physics (51st ed.)
by Chemical Rubber Co.

Audio-Visual:

Community:

Continued and Additional Suggested

Skills to be Learned (Cont.)

Interpreting experimental data
Projecting experimental data to

Materials	Continued and Additional Suggested Learning Experiences
General Chemistry, Williams, & Winston. Book of 51st ed.)	Skills to be Learned (Cont.) Interpreting experimental data Projecting experimental data to actual case.

C 5. An adequate supply of clean air is
 O essential because most organisms Discipline Area Science
 N depend on oxygen, through respiration, Subject Chemistry
 C to release the energy in their food. Problem Orientation Water
 E Also applicable to #4.
 P
 T

BEHAVIORAL OBJECTIVES

Cognitive: The student will record the results of tests indicating the effects of sulphur dioxide on other materials in our environment.

Affective: Student will be aware that sulphur dioxide in the atmosphere may cause harm to our environment and given the opportunity will support those industries having reduced their SO₂ emission.

Skills to be Learned

Lab technique required to produce and collect of gas
 Develop skills associated with using a gas in various test procedures

SUGGESTED LEARNING EXPER

I. Student-Centered in class activity

Laboratory

1. Use a "traditional-course" laboratory manual for a procedure to produce SO₂
 a. S+O₂ or (Na₂SO₃+ H₂SO₄)
2. Using bottles of pure SO₂, immerse materials such as:
 a) plant tissue, b) animal tissue, c) natural fibers, d) synthetic fibers and observe behaviors of these materials over a short and long (24 hours) period of time.

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Problem Orientation Water

Grade 11

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ACTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

Laboratory

1. Use a "traditional-course" laboratory manual for a procedure to produce SO₂

a. S+O₂ or (Na₂SO₃+ H₂SO₄)

2. Using bottles of pure SO₂, immerse materials such as:
a) plant tissue, b) animal tissue, c) natural fibers, d) synthetic fibers and observe behaviors of these materials over a short and long (24 hours) period of time.

II. Outside Resource and Community Activities

1. Research materials to find % of SO₂ in the air in various localities and repeat procedure #2 using these conditions.

2. Compare results of test in pure SO₂ and diluted SO₂.

3. Extrapolate to longer periods of time.

4. Local industry representative to describe the efforts of his company to remove sulphur compounds and other gaseous compounds from their emissions.

Resource and Reference Materials
Publications: Laboratory manual for
"Modern-Chemistry" by Holt,
Rinehart and Winston Co.

Audio-Visual:

Community: Local industry
involved in research
on limitation of sulphur
compound emission from
its own processes.

Continued and Additional Suggested Learning

ials l for	Continued and Additional Suggested Learning Experiences

C 6. Natural resources are not equally
O
N distributed over the earth or over
C
E time and greatly affect the geographic
P
T conditions and quality of life.

Discipline Area _____ Scien
Subject _____ Chemi
Problem Orientation _____ Resou
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BEHAVIORAL OBJECTIVES
Cognitive: On the basis of periodic properties, the student should be able to give 5 properties that make copper ideal for electrical wiring and be able to name 3 substitutes that would fulfill the requirements.
Affective: Students will, by the vehicle of a panel discussion, show evidence of concern over the uneven distribution of resources and the ethics of one nation exploiting these resources for one people & one time.

Skills to be Learned
Reference skills in periodical literature
Discussion-debate skills
Ability to correlate principles of chemistry with world conditions affected by advances in chemistry

SUGGESTED LEARNING EXPERIENCES
I. Student-Centered in class activity
1. Using the transition metals series as a base, introduce these properties of metals (also may fit area of electrochemistry).
a. Malleability
b. Ductility
c. Tensile strength
d. Coefficient of expansion
e. Electrical conductivity
f. Known resources & locations
2. Students investigate properties of electrical wiring, particularly in reference to the common use of copper for same.
3. Students investigate known reserves of conducting metals, and study political, economic and social conditions of countries supplying same to U.S. Students determine what are the most available alternates of copper.
4. Student panel or debate discuss the ethics of U.S. companies exploiting developing countries for their raw materials without paying attention to the issues of social justice and the (Cont.)

resources are not equally

er the earth or over

ly affect the geographic

quality of life.

Discipline Area

Science

Subject

Chemistry

Resource

Problem Orientation

Distribution

Grade

11

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Using the transition metals series as a base, introduce these properties of metals (also may fit area of electrochemistry).
 - a. Malleability
 - b. Ductility
 - c. Tensile strength
 - d. Coefficient of expansion
 - e. Electrical conductivity
 - f. Known resources & locations
2. Students investigate properties of electrical wiring, particularly in reference to the common use of copper for same.
3. Students investigate known reserves of conducting metals, and study political, economic and social conditions of countries supplying same to U.S. Students determine what are the most available alternates of copper.
4. Student panel or debate discuss the ethics of U.S. companies exploiting developing countries for their raw materials without paying attention to the issues of social justice and the (Cont.)

II. Outside Resource and Community Activities

Resources and Reference Materials
Publications:

National Geographic Magazine -
article on U.S. Southwest,
Montana, U.P. Michigan,
Chile, Bolivia, etc.

Recent newspapers and news maga-
zines referring a. political
conditions in resource countries
and b. standards of living in
same developing countries.

Audio-Visual:

Films - Problems of Conservation:
Minerals, Encyclopedia Britannica,
(involves oil but principles
apply)

Community:

Continued and Additional Suggested Learning

I. (Cont.)

long term implications of this (Use
as examples of reactions to American
colonialism.)

5. Lab experiments on electrochemistry
into this unit e.g. electrochemical

Source Materials	Continued and Additional Suggested Learning Experiences
<p>Magazine - thwest, gan, d news maga- olitical rce countries living in ntries.</p> <p>Conservation: dia Britannica, rinciples</p>	<p>I. (Cont.) long term implications of this (Use Chile and Cuba as examples of reactions to American economic colonialism.) 5. Lab experiments on electrochemistry could be worked into this unit e.g. electrochemical cells.</p>

ESEA Title III - 59-70-0135-1 Project I-C-E

C 7. Factors such as facilitating transportation,
 O
 N economic conditions, population growth, Discipline Area Scie
 C
 E and increased leisure time have a great Subject Chem
 P
 T influence on changes in land use and Problem Orientation I
 centers of population density.

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: The student will draw a map of Wisconsin & Upper Michigan, showing the distribution of former & present mineral deposits over these states.
 Affective: Given the opportunity, the students will assist in re-cycling minerals normally mined in Wisconsin. This exercise enhances the students knowledge of this region's mining history, the reinforcement of the idea that minerals are non-renewable, that remaining mineral matter can cause destruction of land in the mine area & also how chemicals are derived from mineral sources.

I. Student-Centered in class activity
 A. Classroom
 1. Have discussion of source materials in class, along with derivation of chemicals.

Skills to be Learned

Interpreting historical material
 Reorganization & presentation of materials
 Processes for purifying ores and chemicals
 Map construction

as facilitating transportation, _____
 _____, population growth, Discipline Area Science
 leisure time have a great Subject Chemistry
 changes in land use and Problem Orientation Land Use Grade 11
 population density.

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
<p>Student will consin & showing the former & deposits . the students e-cycling y mined in exercise dents s region's the rein- idea that -renewable, mineral destruction ine area & is are derived rces.</p>	<p>I. Student-Centered in class activity A. Classroom 1. Have discussion of source materials in class, along with derivation of chemicals.</p>	<p>II. Outside Resource and Community Activities A. Library 1. Research library materials for mining & ore books, use of geological surveys & historical data, concerning the impact of the mines. 2. Research purification processes of raw ores from texts & other sources. 3. Construction of maps showing mines (past & present) & land use & misuse. 4. Use geological surveys etc. & historical data to construct above maps.</p>
<p>urned storical & presentation urifying ores n</p>		

Resource and Reference Materials	Continued and Additional Suggested
<p><u>Publications:</u></p> <p> <u>Wisconsin Historical Society</u> <u>Pamphlet, Mining in Wisconsin</u> <u>Modern Chemistry, Holt, Rinehart</u> <u>& Winston</u> </p> <p> <u>Audio-Visual:</u> <u>Geological survey maps</u> </p> <p><u>Community:</u></p>	

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Continued and Additional Suggested Learning Experiences

C 6. Cultural, economic, social, and
 O
 N political factors determine status
 C
 E of man's values and attitudes
 P
 T toward his environment.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> The student will develop a chemical or industrial process for the recycling of one material that is ordinarily wasted.</p> <p><u>Affective:</u> Student will demonstrate his process to an industry or community organization with the intention of getting the recycling accomplished.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Discuss examples of local recycling either in operation or possible future operations. 2. Set up process for recycling of one material. 3. Design and build pilot process plant (if feasible) 4. List recycling operations in existence & their success or failure.
<p><u>Skills to be Learned</u></p> <p>Research in local industries</p> <p>Writing chemical reactions with practical uses</p> <p>Designing of a process that is unique.</p>	

economic, social, and
factors determine status
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environment.

Discipline Area Science
Subject Chemistry
Problem Orientation Re-Cycling Grade 11

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Discuss examples of local recycling either in operation or possible future operations.
 2. Set up process for re-cycling of one material.
 3. Design and build pilot process plant (if feasible)
 4. List recycling operations in existence & their success or failure.

- II. Outside Resource and Community Activities
1. Bring in resource speaker from area industry that uses recycling (paper industry), field trip to local recycling operation.
 2. Survey home wastes for possible materials that are being wasted.
 3. Field trip or speaker talks on some type of recycling.

Resource and Reference Materials	Continued and Additional Suggested
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Publications:

Popular Mechanics
April 1971
Busch Brewing Co.
Recycling Pamphlet
Eco-News Letter

Audio-Visual:

Community:

Materials	Continued and Additional Suggested Learning Experiences
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C 9. Man has the ability to manage,
 O
 N manipulate, and change his
 C
 E environment.
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 T

Discipline Area Scien
 Subject Chemi
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 Problem Orientation Na

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p>Cognitive: Students will investigate the relationship between chemical equilibria & biological equilibria factors & discover that man's application of chemicals can be a key stress factor in destroying biological stability.</p> <p>Affective: By written reports, the student will show evidence of the social-environmental conscience needed in the trained scientist & will show awareness that chemical preinciple have meaning at the applied level in the living world.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. As part of the discussion readings, & labs on chemical equilibrium reactions, make comparison & contrast to the concepts of the dynamic equilibrium concept of biological communities & ecosystems. 2. Illustrate, Le Chateliers Principle of chemical equilibria systems by discussing the equilibrium reaction of carbon dioxide and various carbonates in lake water. Emphasize the necessity of this reaction to provide reserve CO₂ for algal photosynthesis. (See Ruttner or other standard text of Limnology) 3. By standard techniques, measure the several types of alkalinity reported by limnologists in lake studies (phenolphthalein, murexide, standard pH). Apply to various samples of local lakes & pond waters. 4. Consider the concepts of population & intraspecific population dynamics in biotic communities as analogous to the concept of chemical equilibrium.
<p><u>Skills to be Learned</u></p> <p>Correlation between a principle of the chemical sciences & an environmental principle</p> <p>Balancing equilibria reactions</p> <p>Use of colorimetric indicators</p> <p>Library methods</p> <p>Report writing</p>	

ESEA Title III -59-70-0135-1 Project I-C-E

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Discipline Area Science

Subject Chemistry

Balance of

Problem Orientation Nature

Grade 11

REAL OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. As part of the discussions, readings, & labs on chemical equilibrium reactions, make comparison & contrast to the concepts of the dynamic equilibrium concept of biotic communities & ecosystems.
2. Illustrate, Le Chateliers Principle of chemical equilibria systems by discussing the equilibrium reaction of carbon dioxide and various carbonates in lake water. Emphasize the necessity of this reaction to provide reserve CO_2 for algal photosynthesis. (See Ruttner or other standard text of Limnology)
3. By standard techniques, measure the several types of alkalinity reported by limnologists in lake studies (phenolphthaleine, methyl orange, standard pH). Apply to various samples of local lake & pond waters.
4. Consider the concepts of inter & intraspecific population dynamics in biotic communities as analogous to the concept (cont.)

II. Outside Resource and Community Activities

Resource and Reference Materials
Publications:

Foundations of Chemistry, Toon,
Ellis, Brodtkin--Holt, Rinehart
& Winston
Fundamentals of Limnology, Ruttner
U. Toronto Press, pp. 61-73
Ecology of Inland Waters &
Estuaries, Ried - Reinhold :
pp. 156-163
Limnological Methods, Welch
Cleaning Our Environment: The
Chemical Basis for Action
American Chemical Society
Fundamentals of Ecology, Odum
Environmental Conservation,
Dasman - J. Wiley & Sons
Recent periodical references on
the pesticide questions

Audio-Visual:

Equilibrium, Color, BAVI, #5653,
\$6.00, Modern Learning Aids

Community:

Continued and Additional Suggested Learning
I. (cont.)

- of chemical equilibria systems. Ex
are less precise reactions than th
because of greater complexity of t
community. Explain that these reac
governed by chemical equilibria re
just studied.
5. Have students investigate the rol
chemicals, e.g. pesticides such as
the equilibrium of nature by chang
life systems creating the same str
enunciated in Le Chateliers Princ
 6. Students submit reports centered
sibility of the chemist & the chem
to investigate the ecosystem side
with application of the synthetic
control over some fragment of an e

Materials	Continued and Additional Suggested Learning Experiences
<p>oon, hart</p> <p>Ruttner 3</p> <p>the</p> <p>um</p> <p>s on</p> <p>5653, s</p>	<p>I. (cont.)</p> <p>of chemical equilibria systems. Explain that these are less precise reactions than the chemical systems because of greater complexity of the biotic community. Explain that these reactions are in part governed by chemical equilibria reactions such as just studied.</p> <p>5. Have students investigate the role of the synthetic chemicals, e.g. pesticides such as DDT, in upsetting the equilibrium of nature by changing conditions of life systems creating the same stress condition as enunciated in Le Chateliers Principle.</p> <p>6. Students submit reports centered on the responsibility of the chemist & the chemical corporations to investigate the ecosystem side effects associated with application of the synthetic chemicals for control over some fragment of an ecosystem unit.</p>

C 10. Short-term economic gains may

O

N produce long-term environmental

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E losses.

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Discipline Area Science

Subject Chemistry

Problem Orientation Laboratory

ESRA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: The student should be able to present 3 written arguments for & 3 written arguments against allowing the development of the taconite industry in northern Wisconsin.
Affective: While preparing material for debate, the student will investigate resource use abuse problems having decision aspects for industry & society.

Skills to be Learned

Recognition of the relationship between environmental & social issues & natural resource development
Laboratory skills
Debate skills

SUGGESTED LEARNING

- I. Student-Centered in class activity
- A. Classroom
 1. Students gather information on the steel making process & specific information on taconite ore mining & processing.
 2. Set up debate between those favoring the industry in Wisconsin & those against it.
 3. Point out the possible effects on other resources in the area. e.g. Water, land, forms, forests, wildlife, etc.
 4. Laboratory experiment on chemical properties of iron & other transition metals & their ores.

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Discipline Area Science

Subject Chemistry

Problem Orientation Land Destruction Grade 11

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Students gather information on the steel making process & specific information on taconite ore mining & processing.
2. Set up debate between those favoring the industry in Wisconsin & those against it.
3. Point out the possible effects on other resources in the area. e.g. Water, land forms, forests, wildlife, etc.
4. Laboratory experiment on chemical properties of iron & other transition metals & their ores.

II. Outside Resource and Community Activities

Resource and Reference Materials	Continued and Additional Suggested
<p><u>Publications:</u></p> <p><u>Speaking by Doing</u>, National Textbook Co., Skokie, Ill.</p> <p><u>30 Basic Speech Experiences</u>, Clark Pub. Co. (Has an excellent, workable chapter on debate)</p> <p>Earning statements from Taconite Industry</p> <p><u>Audio-Visual:</u></p> <p><u>Film:</u></p> <p><u>Yours is the Land</u>, 20 min., BAVI, \$6.75</p> <p><u>Community:</u></p> <p>State of Wis. Dept. of Labor, report on states industries National Wildlife Federation Wilderness Watch & other Conservation clubs Sierra Club DNR - Report of industrial effects on the environment</p>	

Materials	Continued and Additional Suggested Learning Experiences
<p>er on</p> <p>onite</p>	

C 11. Individual acts, duplicated

O

N or compounded, produce significant

C

E environmental alterations over time.

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Discipline Area Science

Subject

Chemistry

Problem Orientation Problem

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: The student will calculate (mathematically) the total waste material produced by an average family over a year's time. (Solids, liquids, gases)
Affective: Students indicate during discussion that they will individually reduce their amount of waste materials in an attempt to lessen the total amounts needing disposal.

Skills to be Learned
Mathematical skills
Researching and interpreting data
Actual inventory of garbage (waste)
Projecting solutions for existing problems (problem solving)

- I. Student-Centered in class activity
 1. Class participation in computing average annual waste production.
 2. Application to community, nation, possibly, world based on multiplicative factor.
 3. Predictions of future waste volume produced over 30-40 year span. Based on present disposal methods.
 4. Panel discussion of possible future disposal methods designed to reduce waste accumulation.

ESEA Title III - 59-70-0135-1 Project I-C-E

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Discipline Area Science

over time.

Subject

Chemistry

Problem Orientation Pollution Grade 11

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Class participation in computing average annual waste production.
2. Application to community, nation, possibly, world based on multiplicative factor.
3. Predictions of future waste volume produced over 30-40 year span. Based on present disposal methods.
4. Panel discussion of possible future disposal methods designed to reduce waste accumulation.

II. Outside Resource and Community Activities

1. If possible, bring in sanitary landfill operator or incinerator authority to discuss major problems in disposing of waste materials.

Resource and Reference Materials	Continued and Additional Suggested
<p>Publications: "Eco-Action Newsletter"</p> <p><u>Audio-Visual:</u></p> <p><u>Community:</u> Local data on landfill, sewage plant, incinerator, etc. DNR representative</p>	

als	Continued and Additional Suggested Learning Experiences
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C 12. Private ownership must be

N regarded as a stewardship and

E should not encroach upon or violate

T the individual right of others.

Discipline Area Sci

Subject Che

Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: The student should be able to gather 4 pieces of evidence either in support of or against the development of more nuclear power plants.
Affective: The students will suggest a personal commitment to sacrifice rather than demand the production of more power.

- I. Student-Centered in class activity
A. Classroom
1. Discuss Nuclear Power Plant operation.
a. Reactor structure
b. Reactions involved
c. Locations used

II.

Skills to be Learned

Researching
Investigation
Writing
Discussion

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Discipline Area Science

Subject Chemistry

Problem Orientation Energy Grade 11

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A. Classroom
1. Discuss Nuclear Power Plant operation.
 - a. Reactor structure
 - b. Reactions involved
 - c. Locations used

- II. Outside Resource and Community Activities
- A. Outside classroom
1. Visitation to a local Nuclear Plant.
 2. Locate articles & papers that will provide either support for or evidence against more Nuclear Fission Plants. Take a stand and debate the issues.
 3. Have Wisconsin Public Service person come to class and talk on the "Need for Nuclear Power Plants."

ned

Materials

Continued and Additional Suggested Learning Experiences

AVI, #6378

PROJECT I-C-E

Episode Evaluation Form
(Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may use the following format. Please feel free to adapt it and add more pages. comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

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Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 12

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338

Robert Warpi
Robert Kellin
George Howle

INSTRUCTION - CURRICULUM - ENVIRONMENT

PROGRAM FOR ENVIRONMENTAL EDUCATION

Science GRADE 12

le III E.S.E.A.

CESA's 3-8-9

in 54301

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help of over a hundred teachers, year long meetings, a summer work ecologists, this guide means realistic, developed aid for you. which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are ces--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know y to adapt, adopt, or use. Be design, the range of suggestio mentation and usage are even wider. Many episodes are self others can be changed in part or developed more keenly ove possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learni plan. The reasons are simple. No guide has all the answe unless viewed in the context of your classroom situation. give it a triple reading, check over the resources listed, prime your students, and seek help. The Project personnel knowledge page stand ready to aid your efforts. Feel f
4. The Project Resource Materials Center serves all CESA 3, 8 private. We will send available materials pre-paid. Call visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school li Center materials. Please offer suggestions, comments, or a service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scre suggestions on the episode pages or use the attached evalua lected in late May next year and will be used in our revisi reactions and suggestions--negative and positive. Please no in the episodes may refer to specific, local community reso cases, individual school districts and teachers will have t stitutes. A list of terms pertinent to the episodes is be
7. Ecologists and other experts have simplified the issue--sur Creation's beauty and complexity--often noted as the work c and human energy to save. A year's work by a hundred of yo gesture. Without you, their work will crumble, and so migh let us live to think, feel, and act in harmony with our wor

1. Cognitive means a measurable mental skill, ability, or p
2. Affective refers to student attitudes, values, and feeli
3. APWI means Acceptable Performance Will Include (labels a
4. EPA - Environmental Problem Area.

PREFACE

excite students about their environment, help is ready. Thanks to the efforts of teachers, year long meetings, a summer workshop, university consultants and guide means realistic, developed aid for you. Please note the following ideas used by teachers in writing and editing this guide.

supplementary in nature and the episodes are designed--at appropriate instances--into existing, logical course content.

Each episode offers suggestions. Since you know your students best, you decide what to use, or use. Be design, the range of suggestions is wide; your chances for experimentation are even wider. Many episodes are self-contained, others open-ended, still others changed in part or developed more keenly over a few weeks. These built-in episodes allow you to explore.

As you try the episodes and suggested learning experiences but please pre-plan your lessons are simple. No guide has all the answers and no curriculum will work in the context of your classroom situation. Thus, before trying an episode, do some reading, check over the resources listed, make mental and actual notes, discuss with students, and seek help. The Project personnel and teachers listed on the acknowledgment page stand ready to aid your efforts. Feel free to ask their help in pre-planning.

The Source Materials Center serves all CESA 3, 8, and 9 area schools--public and private--call 32-4338.

The Project ICE Bibliography in your school library for available Resource Materials. Please offer suggestions, comments, or advice--at any time--so that this work will help each other.

Work with the guide by reacting to it with scratch ideas, notes, and extended discussion. Use the episode pages or use the attached evaluation format, which will be collected May next year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed may refer to specific, local community resources or conditions. In such cases, local school districts and teachers will have to adopt local or available substitutes. A list of terms pertinent to the episodes is below.

Other experts have simplified the issue--survival--yours, mine, our students, and the complexity--often noted as the work of a genius--will take our genius to save. A year's work by a hundred of your fellow teachers is a saving grace for you, their work will crumble, and so might we all--literally. Instead, think, feel, and act in harmony with our world.

Editorial Board

...a measurable mental skill, ability, or process based on factual data.
...to student attitudes, values, and feelings.
...ceptable Performance Will Include (labels a cognitive or mental performance.)
...mental Problem Area.

ACKNOWLEDGEMENTS: The following teachers and consultants participated
of the Supplementary Environmental Education Guide

CESA #3

Eugene Anderson, Peshtigo
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John Cowling, Niagara
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Lillian Goddard, Coleman
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Ron Schreier, Omro

Joan
Angel
Harol
Antho
Lilli
Carme
Joan
Billi
Rev.
Robert
Russ
Paul
Roy Lu
Sister
Jim Ma
Doris
Joyce
Richar
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 Roy Lukes, Gibraltar
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 James Wiza, De Pere
 John Torgerson, Kewaunee
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 Greg Schmitt, Cathedral
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 David Bartz, Sturgeon Bay
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 Dennis Bryan, UWGB

C 1. Energy from the sun, the basic source
 O
 N of all energy, is converted through plant
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 E photosynthesis into a form all living
 P
 T things can use for life processes.

Discipline A

Subject

Problem Ori

BEHAVIORAL OBJECTIVES

Cognitive: The students will measure, record, graph, and compare the photosynthetic properties of plants growing under simulated or actual clear and polluted air conditions using oxygen production and dry weight as experimental criteria.

Affective: Students will become advocates of legislation and enforcement of methods designed to remove light absorbers from the atmosphere by writing to their legislators proposing such laws.

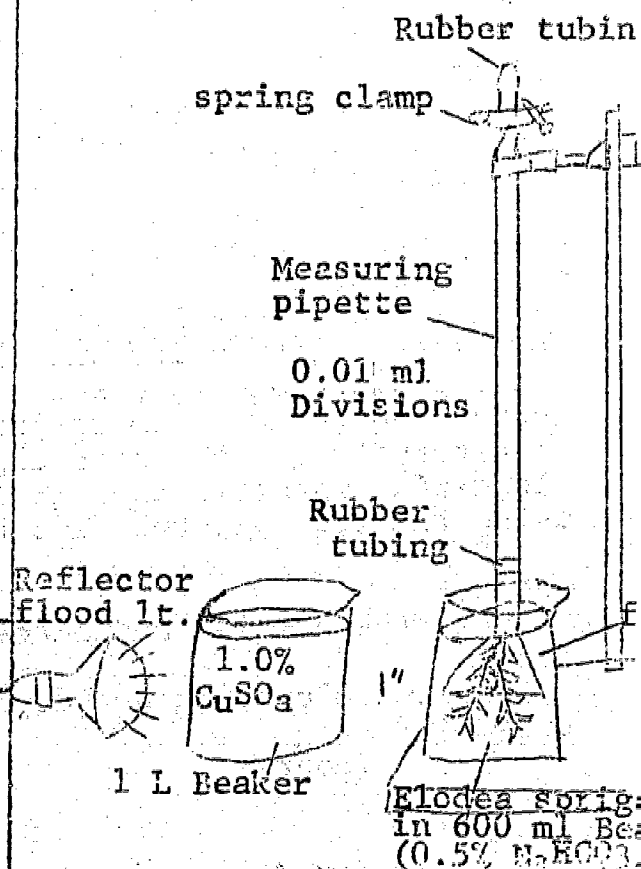
A comparison of polluted air and clear air photosynthetic rates will impress upon the students the fact that air pollution threatens the basic needs of human existence: oxygen and food.

Skills to be Learned
 (cont. on reverse side)

SUGGESTED

I. Student-Centered in class activity

1. Classroom Experience - E
 OF LIGHT INTENSITY ON PHOT
 SYNTHETIC RATE. Set up app
 atus as shown below:



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Discipline Area Science
 Subject Advanced Biology
 Problem Orientation Air Pollution Grade 12

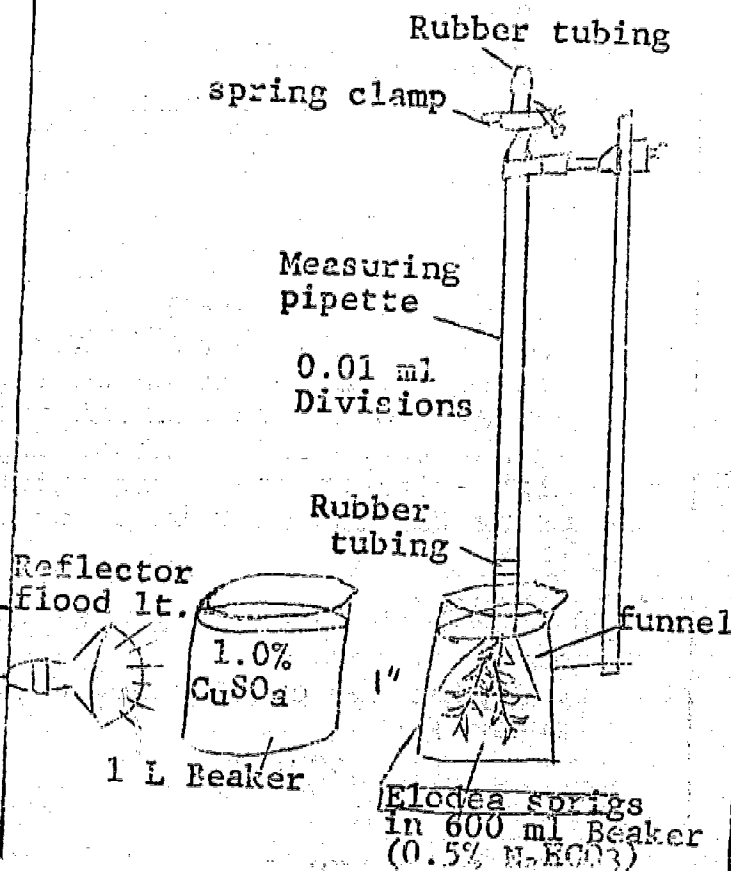
OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. Classroom Experience - EFFECT OF LIGHT INTENSITY ON PHOTOSYNTHETIC RATE. Set up apparatus as shown below:



- II. Outside Resource and Community Activities
 - EFFECTS OF POLLUTED AIR ON PHOTOSYNTHETIC RATE.
 1. Establish correspondence with a high school biology department located in a heavily industrialized area.
 2. Determine dates, times and recording and experimental standards which will be used by your experimental team and the "correspondence team."
 3. Set potted coleus plants in outside planters and allow them to become acclimated.
 4. Measure as many environmental factors as you can during the experiment.

For Later Correlation:

 5. Begin the experiment as early in the day as possible.
 6. Using a No. 9 cork borer, cut 62 discs (1 sq. decimeter) each from the leaves of five coleus plants.
 7. Be sure to leave enough unsampled leaves for later experimentation. (cont.)

Resource and Reference Materials Publications:

Meyer, Anderson, and Swanson, Laboratory Plant Physiology, D. Van Nostrand Co., Inc., New York, 1955.

Strafford, G. A., Essentials of Plant Physiology, Heinemann Educ. Books, Ltd., London, 1965.

Rosenberg, Jerome L., Photosynthesis, Holt, Rinehart, and Winston, Inc. New York, 1965.

Phillips, Edwin A., Field Ecology, D.C. Heath and Company, Boston, 1964.

Humphrey, Van Dyke, and Willis, Life in the Laboratory, Harcourt, Brace and World, Inc., New York, 1965.

Audio-Visual:

Filmstrip Series: Crisis of the Environment, New York Times Book and Educational Division.

Community:

Skills to be Learned

Experimentation with plant materials providing opportunities to collect data, analyze those data, and present a conclusive report regarding the dangers of air pollution.

Continued and Additional Suggestions

I. (cont)

2. Use a 300 watt lamp.
3. Cut bases of two elodea sprigs and place them in a funnel with bases near the funnel.
4. Release the spring clamp and rubber tube until the water level in the pipette.
5. Reclamp the rubber tubing. (If there is an air leak and the apparatus will not work.)
6. Turn on the floodlight.
7. When the first bubbles appear, record the water level.
8. Record water level again 15 minutes later (reading from initial reading).
9. Calculate photosynthetic rate in terms of oxygen released per hour.
10. Substitute a 150 watt lamp and repeat the experiment.
11. With a bar graph, graph the results of the experiment.
12. There are 2.7×10^{19} molecules of oxygen in one liter of water. An average of 6 oxygen molecules are produced for each glucose molecule synthesized. How many glucose molecules have been produced/hour? How many intensities. Question for Analysis: Why, at times, exists under only 55-60% oxygen? due to pollution-laden skies. How can we help? Questions that pertain to the experiment just completed. An alternate to the above experiment is to use algae-rich water in the first (1) and (2) using the 300 watt bulb for both.

II. (cont.)

8. Label the samples and place in a dark place for 48 hours.
9. Repeat the cutting and drying experiment.

(cont.)

Materials

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Continued and Additional Suggested Learning Experiences

- I. (cont)
2. Use a 300 watt lamp.
3. Cut bases of two elodea sprigs diagonally and place in funnel with bases near the funnel stem.
4. Release the spring clamp and apply mouth suction through the rubber tube until the water level is near the top of the pipette.
5. Reclamp the rubber tubing. (If the water level drops, there is an air leak and the apparatus must be checked)
6. Turn on the floodlight.
7. When the first bubbles appear, record the time and water level.
8. Record water level again 15 minutes later. (Subtract final reading from initial reading)
9. Calculate photosynthetic rate in milliliters of oxygen released per hour.
10. Substitute a 150 watt lamp and repeat the experiment.
11. With a bar graph, graph the results of this experiment.
12. There are 2.7×10^{19} molecules of oxygen/milliliter of volume. An average of 6 oxygen molecules are released for each glucose molecule synthesized. Calculate how many glucose molecules have been produced/hour at each of the two light intensities. Question for Analysis: The City of Chicago, at times, exists under only 55-60% of the available sunlight due to pollution-laden skies. How does this information pertain to the experiment just completed. An alternate to the above experiment is the substitution of algae-rich water in the first (1 L) beaker as the second test using the 300 watt bulb for both tests.

II. (cont.)

8. Label the samples and place in an oven at 105° for several days.
9. Repeat the cutting and drying late in the afternoon (before sunset).

(cont.)

Continued and Additional Suggested Learning Experiences

II. (cont.)

10. Weigh cuttings with an analytical balance.
11. Repeat this experiment once each week for five weeks.
12. Calculate the increase of dry weight in milligrams/hour
13. Graph a comparison of your data with those from the coop
14. Write a conclusive analysis of the effects of air pollut

FIELD ACTIVITY:

Effects of Polluted air on photosynthetic rate:

1. Select two sites: one located in a clean-air region and burning area.
2. Select a species of shrub growing in similar habitats in
3. Repeat experiment #2. (Effects of polluted air on photosy
4. Use a Ringelmann Scale to measure blackness of smoke from
5. Record observable signs of photosynthetic blockages (soo
6. Make calculations, graphs, and analysis as in experiment photosynthetic rate)

Additional Suggested Learning Experiences

Measurements with an analytical balance.
Repeat this experiment once each week for five weeks.
Measure the increase of dry weight in milligrams/hour and in milligrams/decimeter²hour.
Make a comparison of your data with those from the cooperating school.
Perform a conclusive analysis of the effects of air pollution on photosynthetic rate.

TV:

Polluted air on photosynthetic rate:

Two sites: one located in a clean-air region and one located near a solid waste area.

Same species of shrub growing in similar habitats in each location.

Experiment #2. (Effects of polluted air on photosynthetic rate)

Use a Engelmann Scale to measure blackness of smoke from burning dump.

Look for observable signs of photosynthetic blockages (soot on leaf surfaces; burns; etc.)
Make calculations, graphs, and analysis as in experiment #2. (Effects of Polluted Air on photosynthetic rate)

C 1. Energy from the sun, the basic source
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 E plant photosynthesis into a form all Subject
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 cesses.

BEHAVIORAL OBJECTIVES	SUGGESTED
<p><u>Cognitive:</u> By experimen- tation, the student will find that the earth re- ceives a finite amount of energy from the sun and that it can be meas- ured in watts/cm²</p> <p><u>Affective:</u> Student will indicate during discussion his awareness that a great amount of energy is avail- able but that much re- search is needed if there is to be efficient utili- zation of the energy.</p>	<p>I. Student-Centered in cla activity</p> <p>1. Experiment: By measur the area of a pan of wa its rate of heating in light, the mass of water the mass of the pan and angle of sunlight, the dent will calculate the power of the sun on the earth's surface in water/cm².</p> <p>2. Determine the energy r quirements to supply a home with electricity, power an automobile, he a home, etc. From these energy requirements and the calculated power of the sun on earth, deter how feasible it would b to utilize the sun's energy directly as a source of power.</p> <p>3. Have individuals const devices such as light- powered electric motor using a photo cell, whi directly converts sunli into energy.</p> <p>4. A class discussion of to use the sun's energy directly. (Cont</p>
<p><u>Skills to be Learned</u></p> <p>Calorimetry</p> <p>Graphing</p> <p>Using mechanical equivalent of heat constant.</p>	

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Discipline Area Science

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Subject Physics

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Problem Orientation Energy Use Grade 12

GENERAL OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Experiment: By measuring the area of a pan of water, its rate of heating in sunlight, the mass of water, the mass of the pan and the angle of sunlight, the student will calculate the power of the sun on the earth's surface in water/cm^2 .
 2. Determine the energy requirements to supply a home with electricity, power an automobile, heat a home, etc. From these energy requirements and the calculated power of the sun on earth, determine how feasible it would be to utilize the sun's energy directly as a source of power.
 3. Have individuals construct devices such as light-powered electric motor using a photo cell, which directly converts sunlight into energy.
 4. A class discussion of ways to use the sun's energy directly. (Cont.)

II. Outside Resource and Community Activities

Resource and Reference Materials
Publications:

Energy From The Sun by Daryl M. Chapin, Bell Telephone Laboratories, New York, N. Y. 1962. (May be ordered, free of cost, at any Wisconsin Telephone Co. office)

Physics - A Basic Science by Verwiebe, Van Hooft, & Saxon.
Weather Elements, Blair & Fite, Prentice-Hall, 1965.

Audio-Visual:

Community:

Continued and Additional Suggested Le

I. (Cont.)

5. Brainstorming session by small to use or conserve sun's energy.

Materials	Continued and Additional Suggested Learning Experiences
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I. (Cont.)

5. Brainstorming session by small groups on how to use or conserve sun's energy.

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Discipline A

Subject

Problem Ori

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Students will be able to name two components of the atmosphere which affect absorption of radiations from the sun.
Affective: Given the opportunity, students will support organizations attempting to limit man's changing of the atmosphere.

Skills to be Learned

Laboratory procedures and extrapolation of laboratory results to a larger physical environment.

SUGGESTED LEAR

- I. Student-Centered in class activity
 1. Class experiment - two glass jars are fitted with thermometers and stoppers.
 2. A drying agent is placed in one and water vapor in second.
 3. Both jars are placed under a heat lamp and temperatures are recorded over a short time interval.
 4. The procedure is repeated with one jar containing air and the second containing high percentage of CO₂.
 5. Temperature change rates are to be determined.
 6. Discussion by students in small groups of the possible consequences of changing component percentages in the earth's atmosphere.

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Discipline Area

Science

Subject

Physics

Problem Orientation Sun Energy

Grade 12

RAL OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Class experiment - two glass jars are fitted with thermometers and stoppers.
2. A drying agent is placed in one and water vapor in the second.
3. Both jars are placed under a heat lamp and temperatures are recorded over a short time interval.
4. The procedure is repeated with one jar containing air and the second containing a high percentage of CO_2 .
5. Temperature change rates are to be determined.
6. Discussion by students in small groups of the possible consequences of changing component percentages in the earth's atmosphere.

II. Outside Resource and Community Activities

Resource and Reference Materials	Continued and Additional Suggestions
<p><u>Publications:</u></p> <p>"Quarterly Journal - Royal Meteorological Society", '64, p. 223.</p> <p>"Climate and Weather," Day and Sternes, Addison-Wesley Publishing Co., 1970.</p> <p>"Weather and Climate: Problems and Prospects", National Academy of Sciences - National Research Council, 1966.</p> <p><u>Audio-Visual:</u></p>	
<p><u>Community:</u></p>	

Materials

Continued and Additional Suggested Learning Experiences

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Discipline Area Sci

Subject Adv

Problem Orientation Ene

BEHAVIORAL OBJECTIVES

Cognitive: The student will contrast the effect of the sun-energy-photosynthesis reaction with the respiration use of energy by testing the oxygen production of algae in the light & dark.
Affective: The student will judge that sunlight energy is essential for all life by applying test results to the general question of the photosynthesis-respiration-energy equation.

Skills to be Learned

Observation & data collection
Measurement
Lab procedure
Interpreting data
Inductive reasoning

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A.1. Use a cultured batch of algal-enriched water or a reasonably algal-enriched batch of pond water. Mix well and fill 3 B.O.D.-type bottles.
2. Test one bottle for dissolved oxygen (D.O.); to check the baseline D.O., use the Hach kit or standard Winkles method for D.O.
3. Cover one B.O.D. bottle with aluminum foil to exclude all light.
4. Submerge this & the remaining B.O.D. bottle in water to neck in a pan. (Water maintains even temperature). Leave for 30 min. to 2 hrs. in well-lighted area.
5. Remove B.O.D. bottles, run D.O. test, and calculate, both positive & negative, from baseline D.O.
6. Total addition of D.O. is calculated by calculating difference between light & dark bottles to give gross primary productivity. Net productivity in the (Cont.)

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Discipline Area

Science

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Subject

Advanced Biology

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Problem Orientation

Energy Use

Grade 12

OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

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- I. Student-Centered in class activity
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 2. Test one bottle for dissolved oxygen (D.O.); to check the baseline D.O., use the Hach kit or standard Winkles method for D.O.
 3. Cover one B.O.D. bottle with aluminum foil to exclude all light.
 4. Submerge this & the remaining B.O.D. bottle in water to neck in a pan. (Water maintains even temperature). Leave for 30 min. to 2 hrs. in well-lighted area.
 5. Remove B.O.D. bottles, run D.O. test, and calculate, both positive & negative, from baseline D.O.
 6. Total addition of D.O. is calculated by calculating difference between light & dark bottles to give gross primary productivity. Net productivity in the (Cont.)

II. Outside Resource and
Community Activities

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Resource and Reference Materials
Publications:

Welch Limnological Methods

Reid. Ecology of Inland Waters and Estuaries.

Ruttner. Fundamentals of Limnology

Audio-Visual:

Hach Chemical Kit - Dissolved Oxygen.

Community:

local ponds

Continued and Additional Suggested

I. (Cont.)

light is calculated from the light bottle reading & baseline is the difference between the baseline D.O.

B. If a pure algal culture without is used, rate of change of standing is calculated.

1. Using a well-mixed algal culture to be below carrying capacity, filter through a fine-grade filter, air dry, weigh.

2. Let another equal aliquot stand in a lighted area, filter, air dry, weigh. Weight difference to find the crop. (Note: algal growth on filter to be scraped and added to the filter medium. Accuracy of this test limited by filter properties and scale accuracy.)

C. Discuss the implications of the dissolved oxygen and standing crop.

ice Materials

ethods
nd Waters and
of Limnology

Continued and Additional Suggested Learning Experiences

I. (Cont.)

light is calculated from the difference between the light bottle reading & baseline D.O. net respiration is the difference between the dark bottle reading & baseline D.O.

B. If a pure algal culture without zooplankter grazers is used, rate of change of standing crop can be calculated.

1. Using a well-mixed algal culture sufficiently diluted to be below carrying capacity, filter one aliquot thru a fine-grade filter, air dry, and weigh.

2. Let another equal aliquot stand several days in a well-lighted area, filter, air dry, and weigh. Compare the weight difference to find the increase in the standing crop. (Note: algal growth on the side of the beaker must be scraped and added to the filter with a distilled water medium. Accuracy of this test will depend on filter qualities and scale accuracy.)

C. Discuss the implications of the sunlight role in increasing dissolved oxygen and standing crop.

dissolved

C 2. All living organisms interact
 O
 N among themselves and their environment,
 C
 E forming an intricate unit called an
 P
 T ecosystem.

Discipline Area

Subject

Problem Orientation

BEHAVIORAL OBJECTIVES

Cognitive: The student will be able to calculate the loss of energy and the efficiency occurring in transfer of energy in an automobile from its engine to the kinetic energy of the entire body.
Affective: The student will be aware that transfer of energy has a direct relationship to pollution and, given the opportunity, he will choose to operate vehicles in which there is the least loss of energy.

Skills to be Learned

Student will be able to mathematically calculate energy input vs. output as an expression of efficiency.

SUGGESTED LEARNING ACTIVITIES

- I. Student-Centered in class activity
 1. Individual research - Look up the body weight, the horsepower, and the 0-60 mph. acceleration time of a particular automobile. From this, calculate the ft.-lbs of work done by the engine and the ft.-lbs. of energy gained by the car. From these two values, calculate the efficiency.
 2. Data Analysis - (combine data)
 - a) use a graph to compare efficiency and horsepower.
 - b) use a graph to compare efficiency and body weight.

ing organisms interact

elves and their environment,

ntricate unit called an

Discipline Area Science

Subject Physics

Problem Orientation Energy Loss Grade 1

OBJECTIVES

student will
calculate the loss
the efficiency
transfer of
automobile from
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entire body.
student will
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Individual research -
Look up the body weight, the
horsepower, and the 0-60
mph. acceleration time of a
particular automobile. From
this, calculate the ft.-lbs.
of work done by the engine
and the ft.-lbs. of energy
gained by the car. From
these two values, calculate
the efficiency.

2. Data Analysis - (combine
data)
 - a) use a graph to compare
efficiency and horsepower.
 - b) use a graph to compare
efficiency and body weight.

II. Outside Resource and Community Activities

1. Consult with auto
mechanics, etc.

Resource and Reference Materials

Publications:

Magazines such as:

"Popular Science"

"Popular Mechanics"

"Auto Mechanics"

"Industrial Arts Teacher"

Audio-Visual:

Community:

Local Mechanic

Continued and Additional Suggested

erials Continued and Additional Suggested Learning Experiences

C 2. All living organisms interact among
O themselves and their environment, form-
N ing an intricate unit called an
C
E
P ecosystem.
T

Discipline Area _____
Subject _____
Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: Students will measure, record, and compare dry weight, plant size, and color of legumes grown in the presence and absence of nitrogen-fixing bacteria.
Affective: Students will object to and record any attempt to prevent the natural interactions in a biotic community in his local area.

Skills to be Learned

Setting up a scientific investigation
Collecting and validating data
Be able to draw valid written conclusions from results of experiment.
Creation of experimental procedures involving aspects of the environment.
Accurate recording of data
Construction of easily-interpreted graphs of recorded data
Ability to analyze data and suggest possible conclusions.

SUGGESTED LEARNING

I. Student-Centered in class activity
1. Class Experiment - You will need: seeds of a leguminous plant, chlorox, pots of soil, and nitrogen-fixing bacteria (obtained either from growing legumes or from a commercial source such as feed and seed store or farm supply.) Students will plan a procedure after considering the following:
a) Where in nature would you seek the bacteria?
b) How may you be reasonably sure that some of your legumes have been deprived of the nodule bacteria?
c) Are you going to use sterilized soil? Explain
d) Have you considered surface sterilization of the seeds? Explain.
e) Does your procedure require the inoculation of seeds, of soil, both?
f) What procedures will you follow during the growing period? (cont.)

ESEA Title III - 59-70-0135-1 Project I-C-E

organisms interact among

their environment, form-

unit called an

Discipline Area

Science

Subject

Advanced Biology

Problem Orientation Ecosystem

Grade 12

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Class Experiment - You will need: seeds of a leguminous plant, chlorox, pots of soil, and nitrogen-fixing bacteria (obtained either from growing legumes or from a commercial source such as feed and seed store or farm supply.) Students will plan a procedure after considering the following:
 - a) Where in nature would you seek the bacteria?
 - b) How may you be reasonably sure that some of your legumes have been deprived of the nodule bacteria?
 - c) Are you going to use sterilized soil? Explain
 - d) Have you considered surface sterilization of the seeds? Explain.
 - e) Does your procedure require the inoculation of seeds, of soil, both?
 - f) What procedures will you follow during the growing period? (cont.)

II. Outside Resource and Community Activities

1. Supplementary reference work in the library.
2. Contact representatives from one of several available agencies (e.g., county agent, Midland Coop. or Agricultural Records Coop.)
3. Lecture-discussion with outside speaker; emphasis on effects of man-made chemicals on the soil bacteria and consequently on food production of legumes.
4. Follow-up will be the field study as follows:
5. Field Activity: Effects of man-made chemicals on the growth of legumes.
 - a) Obtain permission to experiment on a limited area, on or near the school grounds (if possible a 30' x 30' plot). The area must have well established leguminous plants.
 - b) Class can be divided into teams of convenient (cont.)

Resource and Reference Materials
Publications:

"Laboratory and Field Studies in Biology" by Lasson, Chester A. and Paulson, Richard E., Holt, Rinehart and Winston, Inc., New York, 1958

Audio-Visual:

Community:

Continued and Additional Suggested

I. (cont.)

- g) What standards will you use?
2. Plant your seeds. Record facts you devised. Observations should be made over a 6-week period. Drawing conclusions:
 - a) Are the nodules really the result of bacteria?
 - b) Are all bacteria, or only certain ones, capable of causing nodules?
 - c) How useful is this cooperation to the bacteria?
 - d) How useful is this cooperation to the plant?
 - e) Does the use or overuse of pesticides affect this relationship?
 - f) Does the use or overuse of fertilizers affect this relationship?

II. (cont.)

- size (2-4 students per team)
- c) Each team will select one experimental and one control plot.
- d) The 30 ft. square plot may be divided into four 15 ft. square plots.

x - experimental
c - control

(cont.)

Materials

Studies in
Holt,
Inc.,

Continued and Additional Suggested Learning Experiences

I. (cont.)

g) What standards will you use in comparing the plants?

2. Plant your seeds. Record facts observed, using the standards you devised. Observations should be made weekly for at least a 6-week period. Drawing conclusions:

a) Are the nodules really the result of bacterial activity?

b) Are all bacteria, or only certain kinds of bacteria, capable of causing nodules?

c) How useful is this cooperative arrangement to the legume, to the bacteria?

d) How useful is this cooperative arrangement to man?

e) Does the use or overuse of pesticides or herbicides affect this relationship?

f) Does the use or overuse of fertilizer affect this relationship?

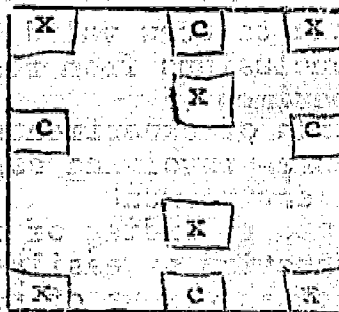
II. (cont.)

size (2-4 students per team)

c) Each team will select one experimental variable of the many possible variants. (Example, insecticides, herbicides, detergents, fertilizers--commercial and natural) etc.

d) The 30 ft. square plot may be divided as in the following diagram:

x - experimental
c - control



(cont.)

Continued and Additional Suggested Learning Experiences

II. (cont.)

- e) Method of application must be determined by each team.
- f) Results may be recorded on a chart similar to the one below:

Team No. _____

Experimental Variable _____

Date	Average Height (Ground to Tip)	Color*	Average dry weight at of experiment

* Because it is necessary to use a constant color guide, a suggestion is to use a painter's color chart of applicable shades of green and brown.

- g) Running time of the experiment can be left to the teacher's discretion. Two to four weeks is recommended.
- h) Graphing of data can be limited only by the student's imagination. Time and size can be graphed. Can color be illustrated graphically?
- i) After student group discussion and analysis, the results of the experiment should be written up in a manner acceptable to the teacher.

Additional Suggested Learning Experiences

Application must be determined by each team.
be recorded on a chart similar to the one below:

Team No. _____
Experimental Variable _____

Stem Height (Base to Tip)	Color*	Average dry weight at conclusion of experiment

If it is necessary to use a constant color guide, a suggestion is
Munsell's color chart of applicable shades of green and yellow.

Some of the experiment can be left to the teacher's discretion but at least four
are suggested.

Experimental data can be limited only by the student's imagination. Certainly dry weight
can be graphed. Can color be illustrated graphically?
After group discussion and analysis, the results of this open-ended experiment
should be presented in a manner acceptable to the teacher.

C 3. Environmental factors are limiting on
 O the numbers of organisms living within
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 C their influence, thus, each environment
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 P has a carrying capacity.
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Discipline Area

Subject

Problem Orientation

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: By investigating figures on nuclear fuel reserves, students will understand that U^{235} will be available for nuclear reactor production of power for a finite period of time.
Affective: During discussion the students will indicate their awareness that new types of reactors or a change of power source must be developed if power production is to be adequate for the future.

Skills to be Learned

Calculation of length of time remaining for fuels.

SUGGESTED LEARNING

- I. Student-Centered in class activity
 1. Students would find and bring to class articles from newspapers and magazines pertaining to the size and number of nuclear plants in operation and proposed for the future.
 2. Calculation of the number of years expectation until nuclear fuel is exhausted.
 3. Student-led discussion of ideas pertaining to future power production or results of a failure in power production.

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Discipline Area Science
 Subject Physics
 Problem Orientation Nuclear Power Grade 12

OBJECTIVES
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 wer for a
 time.
 discussion
 l indicate
 that new
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 adequate

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Students would find and bring to class articles from newspapers and magazines pertaining to the size and number of nuclear plants in operation and proposed for the future.
 2. Calculation of the number of years expectation until nuclear fuel is exhausted.
 3. Student-led discussion of ideas pertaining to future power production or results of a failure in power production.

- II. Outside Resource and Community Activities
1. Visitation to a nuclear power plant at which time information can be obtained about the mass of fuel used per unit of electrical energy produced.

rned
 length of
 or fuels.

Resource and Reference Materials

Continued and Additional Suggest

Publications:

"America's Natural Resources"
Gallison, Charles H.; Ronald-1967
"Perils of the Peaceful Atom: The
Myth of Safe Nuclear Power Plants"
Curtis & Hogan; Doubleday, 1969
"Natural Resources for U.S. Growth:
A Look Ahead to the Year 2000"
Landsberg; John Hopkins, 1964
"Affluence in Jeopardy: Minerals
and the Political Economy", Park,
W. H. Freeman, 1968

Audio-Visual:

Community:

Materials	Continued and Additional Suggested Learning Experiences
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ces"
 Donald-1967
 Atom: The
 er Plants"
 y, 1969
 S. Growth:
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 Minerals
 y", Park,

[Faint, mostly illegible text in the right column, likely bleed-through from the reverse side of the page. Some words like "atoms", "plants", "growth", and "minerals" are faintly visible.]

C 3. Environmental factors are limiting on
 O the numbers of organisms living within
 N their influence, thus, each environment
 C P has a carrying capacity.

Discipline Area Sci
 Subject Adv
 Problem Orientation

ESEA Title III - 59-70-0135-1 Project 1-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> Given an opportunity to develop a project, student should research, select, set up conduct, analyze, and effectively write a report on the outcome of their particular experiment.</p> <p><u>Affective:</u> The student will accept a personal responsibility for the control of future human population by comparing the actions of humans in an overcrowded situation to the actions of animal societies.</p>	<p>I. Student-Centered in class activity</p> <p>1. Research - Class project involving research pertaining to effects of crowding in natural animal communities.</p> <p>a) discussions involving crowding effects on animals in simulated "slum" areas.</p> <p>b) selection of variable-length projects to be undertaken by teams of 2-6 students.**</p> <p>II. O</p> <p>1. Co</p> <p>fa</p> <p>st</p> <p>so</p> <p>or</p> <p>wi</p> <p>Pos</p> <p>gu</p> <p>**2. :</p> <p>th</p> <p>un</p> <p>si</p> <p>3. I</p> <p>Lal</p> <p>a)</p> <p>cor</p> <p>sia</p> <p>rep</p> <p>nos</p> <p>b)</p> <p>c)</p> <p>mic</p> <p>d)</p> <p>e)</p> <p>f)</p> <p>g)</p>
<p><u>Skills to be Learned</u></p> <p>Experiment selection and development</p> <p>Observation and evaluation of experimental data.</p>	

Factors are limiting on

Animals living within

Each environment

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Discipline Area Science

Subject Advanced Biology

Problem Orientation _____ Grade 12

IVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Research - Class project involving research pertaining to effects of crowding in natural animal communities.
 - a) discussions involving crowding effects on animals in simulated "slum" areas.
 - b) selection of variable-length projects to be undertaken by teams of 2-6 students.**

II. Outside Resource and Community Activities

1. Panel discussion involving faculty members from social studies, area studies, sociology, psychology, or behavioral sciences within the school system. Possible incorporation of guidance personnel.
- **2. Students will develop their projects and record unusual behavior in crowded situations.
3. Field Experiences - (or Lab)
 - a) Start pair of mice in container of predetermined size (feed, clean, and allow reproduction to occur at normal rate).
 - b) Fruitfly cultures.
 - c) Gerbil (as above for mice)
 - d) Daphnia culture.
 - e) Vinegar eel cultures.
 - f) Guppies
 - g) Stickle Backs

Resource and Reference Materials

Continued and Additional Suggested

Publications:

"Population Dynamics", John Cairns, Jr.
Rand McNally Patterns of Life
Series.

"The Population Bomb", Paul Ehrlich;
A Sierra Club/Ballantine Book

"Man's Impact on Nature"

Garden City, N.Y., Natural History
Press, 1969

Audio-Visual:

Film #4703 - "Animal Predators
and The Balance of Nature"
(\$4.00) BAVI - 1968

Community:

Faculty members

Materials	Continued and Additional Suggested Learning Experiences
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John Cairns, Jr. of Life	
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Paul Ehrlich; the Book	
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ural History	
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C 3. Environmental factors are limiting
 C on the numbers of organisms living
 N within their influence, thus, each
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 E
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 T environment has a carrying capacity.

Discipline Area _____
 Subject _____
 Problem Orientation _____

ESHA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Given any species of organisms and all necessary culturing and observing equipment, the students will successfully culture, census, and analyze the growth of the population. The student will construct graphical representations of growth phenomena and will analyze this data in terms of carrying capacity.

Affective: Students will accept a personal responsibility for the control of future human populations, by comparing and keeping a record on the increases in population of other organisms.

Skills to be Learned

Observation of population
 Analysis of collected data
 Presentation of data and analysis in an organized and understandable manner.

SUGGESTED LEARNING

- I. Student-Centered in class activity
1. Classroom Experience - Growth of a Yeast Population.
PROCEDURE -
 a) Inoculate 1 liter of sterile water with 1 pkg. of dry yeast.
 b) After shaking the liquid to suspend the yeast cells uniformly, transfer 1 ml. of this stock to a flask containing 99 ml. of sterile H₂O.
 c) Shake the second dilution of yeast cells to form a uniform suspension. Transfer one ml. of the second suspension to each of two flasks containing 49 ml. of sterile culture medium.
 d) Each student should determine the number of yeast cells per ml. in the second (99 ml.) dilution flask by use of the hemocytometer counting chamber. (The count per large square, 1mm², must be multiplied (cont.)

factors are limiting
organisms living
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Discipline Area Science
 Subject Advanced Biology
 Problem Orientation Microbiology Grade 12

EFFECTIVES
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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Classroom Experience - Growth of a Yeast Population.
PROCEDURE -
 a) Inoculate 1 liter of sterile water with 1 pkg. of dry yeast.
 b) After shaking the liquid to suspend the yeast cells uniformly, transfer 1 ml. of this stock to a flask containing 99 ml. of sterile H₂O.
 c) Shake the second dilution of yeast cells to form a uniform suspension. Transfer one ml. of the second suspension to each of two flasks containing 49 ml. of sterile culture medium.
 d) Each student should determine the number of yeast cells per ml. in the second (99 ml.) dilution flask by use of the hemocytometer counting chamber. (The count per large square, 1mm², must be multiplied
 (cont.)

II. Outside Resource and Community Activities

Resource and Reference Material
Publications:

B.S.C.S. Writers, Biological Science:
Interaction of Experiments and
Ideas, Prentice-Hall, Inc., Englewood
Cliffs, N.J., 1965.

Thompson, Warren S., Population
Problems, McGraw-Hill Book Co.
Inc., New York, 1953.

Odum, Eugene P., Fundamentals of
Ecology, W. B. Sanders Co.,
Philadelphia, 1966.

Sussman, Alfred S., Microbes, Their
Growth, Nutrition, and Interaction,
D.C. Heath and Co., Boston, 1964.

Audio-Visual:

Charts and graphs to be posted on
the bulletin board.

Community:

Local math teacher

Continued and Additional Suggested L

I. (cont.)

by 10,000 to yield cells per cc
population count in the culture
time. Record in a chart similar

Date	Time of Day	Age of

e) Each team member should count
cells daily. The counts of all
daily and recorded on a chart si
chart. (If the mathematical abil
the counts should be recorded as
f) Continue the counts until the
g) Graph individual and team res
x-axis and number of cells on th
ANALYSIS:

1. Explain any variations in
growth curves.
 2. Divide the curve into conv
the factors causing the ph
 3. Compare the growth curve o
a closed environment) to t
curve and predict the anti
population in terms of car
2. Classroom Experience - The Ari
(Interaction of Disciplines)
Outside Speaker: Faculty m
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Inc., Englewood
pulation
book Co.
entals of
Co.,
robes, Their
Interaction,
ston, 1964.

I. (cont.)

by 10,000 to yield cells per cc) This number represents the population count in the culture at 0 hours, the starting time. Record in a chart similar to the following:

Date	Time of Day	Age of Culture	cells/cc

- e) Each team member should count and record the number of cells daily. The counts of all members should be averaged daily and recorded on a chart similar to the individual chart. (If the mathematical ability of the students permits, the counts should be recorded as exponents of 10.)
f) Continue the counts until the cultures are ten days old.
g) Graph individual and team results (Time is shown on the x-axis and number of cells on the y-axis.)

ANALYSIS:

1. Explain any variations in the team and individual growth curves.
 2. Divide the curve into convenient phases and explain the factors causing the phases.
 3. Compare the growth curve of the yeast population (in a closed environment) to the present human population curve and predict the anticipated destiny of the human population in terms of carrying capacity.
2. Classroom Experience - The Arithmetic of Microbial Growth.
(Interaction of Disciplines)

Outside Speaker: Faculty member from school math department.

(cont.)

Continued and Additional Suggested Learning Experiences

I. (cont.)

PROCEDURE -

- a) Lecture-discussion of use of exponents to avoid awkwardness of large numbers.
- b) Practice problems converting large numbers to exponents with 10 as the base, and vice versa, following to exponential form: 175; 9,673,000,000; 4,000; 0.003; 0.47.
- c) Lecture-discussion of logarithms and antilogs.
- d) Practice in converting whole numbers to logarithms.
- e) Practice in multiplying and dividing logarithms.
- f) Problems in projected growth of microbial growth: i.e., a colony of bacteria that doubles every hour. Starting with one organism, how many can be expected in a 24-hour period in unlimited culture medium after eight days?
- g) The use of logs, antilogs, and exponents will prove to be valuable in analyzing population growths.

3. Classroom Experience - A History of Pond Organisms

PROCEDURE -

- a) Students will bring a sample of pond water into the classroom.
- b) While collecting sample, students will also collect abiotic factors: pH, water temperature, photoperiod (time of daybreak and dusk), light intensity, etc.
- c) Using a climatarium or other similar equipment, the natural environment will be duplicated as nearly as possible.
- d) Because the two most obvious elements of the aquatic populations are algae and protozoa, these two general types will be counted with the hemocytometer counts at the end of five weeks.
- e) The weekly counts will be tabulated on a chart similar to the following:

Date	Age of Culture	cells/cc	
		Algae	Protozoa

f) At the end of five weeks, the data will be graphed and analyzed.
ANALYSIS:

1. Explain weekly variations in the culture

(cc)

Suggested Learning Experiences

on of use of exponents to avoid awkwardness of large numbers.
as converting large numbers to exponents with 10 as the base. i.e., convert the
ential form: 175; 9,673,000,000; 4,000; 0.003; 0.478; 0.00000078; 1/100.
on of logarithms and antilogs.

verting whole numbers to logarithms.

ultiplying and dividing logarithms.

ected growth of microbial growth: i.e., a colony of paramecia was observed to

Starting with one organism, how many can be expected to be present in an
medium after eight days?

, antilogs, and exponents will prove to be valuable aids in interpreting and
on growths.

ence - A History of Pond Organisms

ring a sample of pond water into the classroom.

g sample, students will also collect abiotic factors: H₂O temperature, atmos-
, photoperiod (time of daybreak and dusk), light intensity(average), ph of

rium or other similar equipment, the natural environmental conditions will be
ly as possible.

most obvious elements of the aquatic populations are algae and protozoans,
types will be counted with the hemocytometer counting chamber over a period

cs will be tabulated on a chart similar to the following:

	cells/cc	
	Algae	Protözoa

ve weeks, the data will be graphed and analyzed.

ly • ations in the culture

(cont.)

Continued and Additional Suggested Learning Experiences

I. (cont.)

2. Assuming that conditions were optimum at the onset of the experiments in either population.
3. Assuming that a natural carbon cycle is maintained between autotrophs and heterotrophs, predict the outcome of a similar experiment set up with either alone.
4. Which of the two populations appears to be independent and which is dependent?
5. Would changes in environmental conditions affect the carrying capacity of either culture? Suggest variables to test your hypothesis. Carry out the experiment if time permits.

Learning Experiences

ns were optimum at the onset of the experiment, explain any reduction.
l carbon cycle is maintained between autotrophs and heterotrophs,
a similar experiment set up with either algae alone or protozoans
ations appears to be independent and which appears to be dependent?
onmental conditions affect the carrying capacity of this closed
ables to test your hypothesis. Carry out the indicated experiments

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4. An adequate supply of pure
water is essential for life.

Discipline Area _____

Subject _____

Problem Orientation _____

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: By using the amount of water as specified by Government standards for dilution of a radioisotope sample, the student will calculate the total water needed for safe disposal.

Affective: Students will indicate during discussion that there is a need for re-evaluation of disposal methods using water in order to conserve the water.

Skills to be Learned
Using the chart of the Nuclides
Counting radioactivity
Half-life determination

SUGGESTED LEARNING

I. Student-Centered in class activity

A. Pre-lab discussion

The students should know they are being given a solution which contains 6 grams thorium nitrate, & it will be their job to perform the experiment & dispose of the radioactive material at the end. Each student should go to a Chart of the Nuclides & trace the Th²³² down to non-radioactive Pb²⁰⁸, noting the half-lives of each isotope. The extremely long half-life of Th²³² should prove to the students that they cannot wait for it to become stable, so care must be used in disposing of it. From the specific activity the mass of thorium in thorium nitrate & the Federally allowed concentration of Th²³² radiation in water, calculate the amount of water needed to dilute this amount of thorium nitrate to dispose of it.

(cont.)

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essential for life.

Discipline Area Science

Subject Physics

Problem Orientation Water Consumption Grade 12

AL OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Pre-lab discussion

The students should know they are being given a solution which contains 6 grams thorium nitrate, & it will be their job to perform the experiment & dispose of the radioactive material at the end. Each student should go to a Chart of the Nuclides & trace the Th²³² down to non-radioactive Pb²⁰⁸, noting the half-lives of each isotope. The extremely long half-life of Th²³² should prove to the students that they cannot wait for it to become stable, so care must be used in disposing of it. From the specific activity, the mass of thorium in thorium nitrate & the Federally allowed concentration of Th²³² radiation in water, calculate the amount of water needed to dilute this amount of thorium nitrate to dispose of it.
(cont.)

II. Outside Resource and Community Activities

Resource and Reference Materials	Continued and Additional Suggested I
<p><u>Publications:</u></p> <p>Project Physics Handbook Unit 6. Experiment 46 Half-life I, <u>C. Short Lived Radioisotopes</u>, Holt, Rinehart & Winston, New York, 1968.</p> <p>Project Physics Teachers Guide, Unit VI, p. 83, Holt, Rinehart & Winston, New York, 1968.</p> <p>Code of Federal Regulations, CFR Title 10, Atomic Energy, Chapter 1, part 20, Government Printing Office, Washington, D. C.</p> <p><u>Audio-Visual:</u></p> <p>Chart of the Nuclides can be obtained free of charge from Educational Relations, General Electric Company, Schenectady, New York 12305</p> <p><u>Community:</u></p>	<p>I. (cont.)</p> <p><u>The Experiment</u></p> <p>The student will perform the exp The counting should continue until rate is nearly down to zero, alth taken after 10 minutes will be us determination. Allowing the count should prove to the student that of the separated isotope in the t</p> <p><u>Discussion</u></p> <p>Students will discuss the use of agent and the possible ecological</p>

Continued and Additional Suggested Learning Experiences

I. (cont.)

The Experiment

The student will perform the experiment as directed. The counting should continue until the net counting rate is nearly down to zero, although the data taken after 10 minutes will be useless for half-life determination. Allowing the counts to go to zero should prove to the student that he can safely dispose of the separated isotope in the trash.

Discussion

Students will discuss the use of water as a dilution agent and the possible ecological consequences.

C 4. An adequate supply of pure

O water is essential for life.

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Discipline Area Science

Subject Advanced

Problem Orientation Water

BEHAVIORAL OBJECTIVES

Cognitive: Given a general format for construction, students will construct a model and will manipulate conditions in an effort to record, analyze, report, and exhibit effects of these manipulations on the stream life.

Affective: Students will participate in local stream improvement or defend the stream against undesirable intrusions.

Skills to be Learned

Research, sampling, and constructing skills
Data collecting
Data analysis

SUGGESTED LEARNING EXPERIENCES

- | I. Student-Centered in class activities | II. Other |
|--|-----------|
| 1. Interdisciplinary project: Construction of a simulated stream with continuously recycled water. | 1. Co |
| a. Involve wood shop in construction of frame. | 1. t |
| b. Involve metals shop in construction of watertight streambed | 2. r |
| c. Physical sciences to construct pumping systems. | e |
| d. Art to work on stream bed and stream side (Esthetics) | t |
| e. Biology to introduce variety of stream organisms. | s |
| f. Math department may calculate velocity, flow, etc. | n |

ESEA Title III - 59-70-0135-1 Project I-C-E

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Discipline Area Science

Subject Advanced Biology

Problem Orientation Water Grade 11-12

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defend the
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activities

1. Interdisciplinary project:
Construction of a simulated
stream with continuously
recycled water.

a. Involve wood shop in con-
struction of frame.

b. Involve metals shop in
construction of watertight
streambed

c. Physical sciences to
construct pumping systems.

d. Art to work on stream bed
and stream side (Esthetics)

e. Biology to introduce
variety of stream organisms.

f. Math department may calculate
velocity, flow, etc.

II. Outside Resource and
Community Activities

1. Sampling of various stream
types on determination of
natural species distribution

2. If a stream is located near
enough, the students can apply
their learned techniques in
stream improvement with per-
mission of proper government
authority.

Resource and Reference Materials
Publications:

Fresh-Water Biology, Needham and
Needham.

Key to Fresh-Water Animals of the
North Central States by Samuel
Eddy.

Readings in Conservation Ecology,
Cox.

Audio-Visual:

Community:

Continued and Additional Suggested Le

Materials	Continued and Additional Suggested Learning Experiences
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4. An adequate supply of pure water is
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Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

Cognitive: Students will correlate the physiology of movement across cell boundaries in organisms with the damage to organisms observed in field situations affected by road salts, by direct observation of lab tests and field examination.
Affective: Students will submit articles to the local newspaper in which they propose changes in the uses of salt on roads.

- I. Student-Centered in class activity
1. Discussion review of principles of diffusion in organisms.
2. Library research on the effects of salts on:
 - a) aquatic and terrestrial plants
 - b) aquatic and terrestrial animals

Skills to be Learned
Collection and identification of roadside flora and fauna.
Comparative analysis of data.

ESEA Title III - 59-70-0135-1 Project I-C-E

te supply of pure water is
r life.

Discipline Area

Science

Subject

Advanced Biology

Problem Orientation

Water

Grade

12

OBJECTIVES

Students will correlate
biology of move-
ment boundaries
with the damage
observed in
organisms affected
by direct
lab tests
and observation.
Students will
relate to the local
environment which they pro-
vide the uses of

Learned
Identification
of flora and fauna.
Analysis of data.

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Discussion review of principles of diffusion in organisms.
2. Library research on the effects of salts on:
 - a) aquatic and terrestrial plants
 - b) aquatic and terrestrial animals

II. Outside Resource and Community Activities

1. Library research on possible substitutes for chlorides in ice melting.
2. Conduct standard "potato test" or other osmosis experiments showing dehydration by salt solutions.
Potato Test:
Use known length of cut fresh potato, e.g. 40 x 4 x 4 mm, immersed in solutions of varied strengths of salts, sugar, and other soluble diffusible substances. Remeasure after two hours.
3. Qualitative and quantitative survey of flora and fauna in:
 - a) roadside known to be heavily salted
 - b) roadside pond
 - c) roadside stream
4. Survey of above a, b, and c in an area not near possible salting operations.
5. Publication of results in local newspaper with accompanying written articles (cont.)

Resource and Reference Material
Publications:

Taxonomic Keys -- Gray's Manual of
Botany--Spring Flora of
Wisconsin, by Norman Facett.
Eddy, Samuel, Key to Fresh Water
Animals of the North Central States.
Giese, Cell Physiology
Texts on human and animal physiology.
Field Guide - Audubon Society
B.S.C.S. (Green version) Lab Manual

Continued and Additional Suggested Learning

II. (Cont.)

- attempting to influence the reader's
use of salt as a de-icer.
6. Invite speaker from county or city
7. Invite D.N.R. Game Manager to speak

General Rationale

This exercise reviews the principles of
cellular membranes by simple physiology
considers the effects of quantitative
variations of diffusible substances
and on the organism as a whole and
applies the principle to a practical situation

Material	Continued and Additional Suggested Learning Experiences
<p>Manual of Bennett. Fresh Water Central States. All physiology. Society Lab Manual</p>	<p>II. (Cont.)</p> <p>attempting to influence the readers attitude concerning use of salt as a de-icer.</p> <p>6. Invite speaker from county or city highway department.</p> <p>7. Invite D.N.R. Game Manager to speak to class.</p>
	<p><u>General Rationale</u></p> <p>This exercise reviews the principles of movement across cellular membranes by simple physical diffusion. It considers the effects of quantitative changes in concentrations of diffusable substances on the living cell and on the organism as a whole and then applies the principle to a practical situation.</p>

ESEA Title III - 59-70-0135-1 Project I-C-E

C 5. An adequate supply of clean air is
 O
 N essential because most organisms depend
 C
 E on respiration to supply the oxygen
 P
 T needed to release the energy in their
 food.

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BEHAVIORAL OBJECTIVES

SUB

Cognitive: By constructing a model smoke precipitator, demonstrating it, and describing problems of operation, students will gain a knowledge of the principle of electrostatic precipitation as a method for removing particulates from smoke.

I. Student-Centered activity
 1. This will be a project for one a small group of A smoke precipitator constructed as follows

Affective: Students will indicate their acceptance of the need to install air pollution control devices by discussing with positive attitude, the questions of pollution control costs vs. environmental costs resulting from pollution damage.

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Skills to be Learned

Construction
 Library research
 Demonstration and speech
 skills.

(cont.)

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 1. because most organisms depend
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Discipline Area Science
 Subject Physics
 Problem Orientation Air Pollution Grade 12

GENERAL OBJECTIVES

By constructing a
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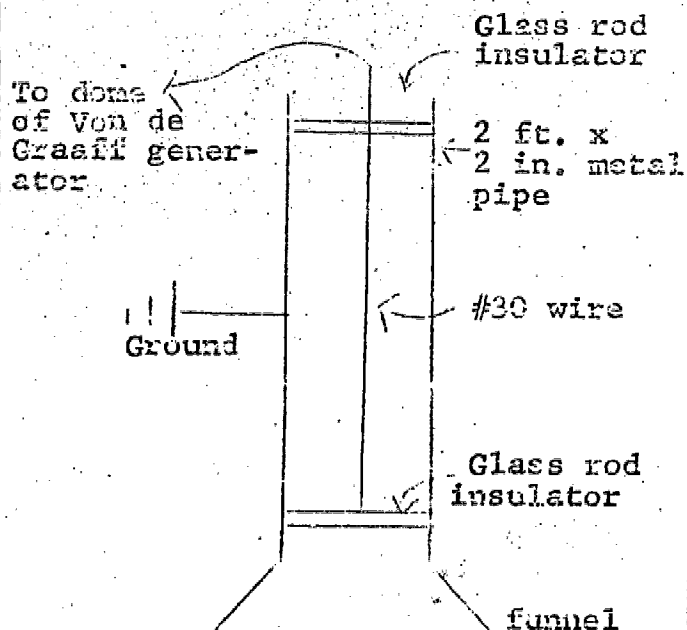
Students will
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. This will be a special project for one student or a small group of students. A smoke precipitator can be constructed as follows:



II. Outside Resource and Community Activities

(cont.)

Resource and Reference Materials

Continued and Additional Suggested

Publications:

- "Electrostatic Precipitators"
McGraw-Hill Encyclopedia of Science
and Technology
McGraw-Hill Book Co., New York,
1960; p. 538.
- "Demonstration Experiments in Physics"
A-5 Smoke Precipitation, McGraw-Hill
Book Co., 1938; p. 434
- Clifford E. Swartz, "Physics and All
That Garbage" The Physics Teacher,
8; (Nov. 1970), p. 421
- Also, look up Cottrell process in any
encyclopedia.

Audio-Visual:

Community:

I. (cont.)

Smoke should preferably be
hydrochloric acid and ammonium
ammonium chloride. Wood or
but not as well. When the
tricity generator is turned
place near the wire, and th
themselves to the smoke par
are drawn to the electrodes.
While this device is simple
complicated when put into p
be emphasized in the studen

Continued and Additional Suggested Learning Experiences

I. (cont.)

Smoke should preferably be made by putting bottles of hydrochloric acid and ammonia near each other, producing ammonium chloride. Wood or cigarette smoke can be used, but not as well. When the Von de Graaff static electricity generator is turned on, a corona discharge takes place near the wire, and the ions produced, attach themselves to the smoke particles. The smoke particles are drawn to the electrodes, leaving nearly clear air. While this device is simple in theory, it is much more complicated when put into practical use, and this should be emphasized in the student's oral presentation.

ESEA Title III - 59-70-0135-1 Project I-C-E

C 5. An adequate supply of clean air is
 O
 N essential because most organisms
 C
 E depend on oxygen, through respiration,
 P
 T to release the energy in their food.

Discipline Area Science
 Subject Physics
 Problem Orientation Energy

BEHAVIORAL OBJECTIVES

Cognitive: The student will record the electrical energy used in his home & determine the distribution of this energy to the various electrical devices in his home & determine which devices could have their use limited.

Affective: The student will be aware of the accumulative effect of each individual's wastefulness & contribution to pollution through power production & will become the "watch dog" of his own home consumption of power by taking a tally & reporting back to class.

Skills to be Learned

Calculation of Kilowatt hours
 Reading of Kilowatt hour meters
 Conversion of calories to Kilowatt hours

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

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SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class
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II. Outside Resource and
Community Activities

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A. Home activity

1. Each student will compute the total kilowatt-hours of electrical energy used in a 24 hour period from the rated wattage of each electrical device in his home & the approximate time in use. Each student is to compare his total with the increase in kilowatt-hours shown on his kilowatt-hour meter over this period.

Note: A fairly accurate method of obtaining the kilowatt-hours in heating water is to estimate the gallons of hot water used, & from this & the temperature rise, compute calories. Then convert calories to kilowatt-hours.

2. Interpreting results:
 - a. By what percent could you cut your energy consumption without really lowering your standard of living?

(cont.)

Resource and Reference Materials
Publications:

The Atmosphere and the Sea in Motion, Bolin, Rockefeller Inst. Press, 1959
Physics - A Basic Science, Verwiebe, VanHooft & Saxon

Audio-Visual:

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Community:

Data form local power generating utility

Continued and Additional Suggested Le
II. (cont.)

- b. What percent of the electrical home do you think is wasted through
- c. Extrapolate total wasted energy and nation.
- d. From data obtained from local calculate the amount of fossil used to produce the wasted energy activity.

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Continued and Additional Suggested Learning Experiences

II. (cont.)

- b. What percent of the electrical energy in your home do you think is wasted through careless use?
- c. Extrapolate total wasted energy to community and nation.
- d. From data obtained from local generating plant, calculate the amount of fossil fuel that is used to produce the wasted energy in above activity.

ESEA Title III - 59-70-0135-1 Project I-C-E

C 6. Natural resources are not equally
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 N distributed over the earth or over
 C
 E time and greatly affect the geographic
 P
 T conditions and quality of life.

Discipline Area _____ Sc
 Subject _____ Ph
 Problem Orientation _____ Po

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING	
<p><u>Cognitive:</u> Students will be able to calculate the power loss as electricity is moved along high voltage power lines.</p> <p><u>Affective:</u> Students will be aware of the need for other than hydrological power generation stations and the possible pollution problems caused by them, but given the opportunity would pay a higher price for those stations contributing the least pollution.</p>	<p>I. Student-Centered in class activity</p> <p>1. Using information obtained at a power plant, the class can calculate the power loss per mile of transmission line using $R = C L/A$ and $P = I^2 R$. Power loss can be related to efficiency and cost.</p>	<p>II.</p>
<p><u>Skills to be Learned</u></p> <p>Formulation of questions</p> <p>Calculations of resistance and power loss</p> <p>Listening for specific information</p>		

sources are not equally

over the earth or over

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d quality of life.

Discipline Area Science

Subject Physics

Problem Orientation Power Grade 12

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Students will calculate the electricity high voltage Students will need for ological n stations e pollution by them, ppportunity her price ons contri- t pollution.	<p>I. Student-Centered in class activity</p> <p>1. Using information obtained at a power plant, the class can calculate the power loss per mile of transmission line using $R = C L/A$ and $P = I^2 R$. Power loss can be related to efficiency and cost.</p>	<p>II. Outside Resource and Community Activities</p> <p>1. Visitation of a hydro-power generating station at which power output, line voltage, amperage, wire size and material information is obtained.</p> <p>Questions to be asked of the station operator should be submitted by the class in advance.</p>
earned questions f resistance specific		

Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u></p> <p><u>Physics: A Basic Science;</u> <u>Verwiebe, Van Hooft, & Saxon,</u> <u>American Book Co.</u> <u>Handbook of Chemistry & Physics</u></p> <p><u>Audio-Visual:</u></p> <p><u>Community:</u> Local utility company rate schedules speaker from local utility company for discussion of other means of power production for local consumers and the possible pollution effects of each type of generator.</p>	

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Continued and Additional Suggested Learning Experiences

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C 6. Natural resources are not equally
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Discipline Area _____
 Subject _____
 Problem Orientation _____

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	EXPANDED LEARNING EXPERIENCES
<p><u>Cognitive:</u> The students will record, analyze, and report the findings of their soil tests and its results or effects on the quality of life and conditions.</p> <p><u>Affective:</u> Students seek to correct any misuse of land around the school used for plantings by testing soil to determine nutrients missing.</p>	<p>I. Student-Centered in class activity</p> <p>1. Using a gallon jar, fill half full of soil and the remainder with water. Shake the jar vigorously and let settle. Then measure the layers of soil & figure your percentages on the layers.</p>	<p>II. Co</p> <p>1. s</p> <p>2. c</p> <p>p</p> <p>a</p> <p>b</p> <p>b</p> <p>l</p> <p>i</p> <p>t</p> <p>t</p> <p>r</p> <p>3. c</p> <p>(</p> <p>U</p> <p>s</p> <p>l</p> <p>4. s</p> <p>p</p> <p>d</p> <p>a</p> <p>o</p> <p>5. a</p> <p>l</p> <p>c</p> <p>s</p> <p>w</p>
<p><u>Skills to be Learned</u></p> <p>Using research materials in analysis of soil</p> <p>Record and analyze laboratory results</p>		

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Science

Subject

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Using a gallon jar, fill half full of soil and the remainder with water. Shake the jar vigorously and let settle. Then measure the layers of soil & figure your percentages on the layers.

II. Outside Resource and Community Activities

1. Do research in library on soil types, textures (size classes for soil texture)
2. Demonstration of a soil profile. Take the students to an area in which a roadway is being put in or a home is being built. You must have 2 or more layers or horizon that differ in properties such as color, texture, structure, consistency, porosity, & chemical reactions.
3. Collect soil samples. Select certain areas for your samples (low area, hilly, wetland, etc.) Using plastic bags for your samples take approximately 15 cm. of soil.
4. Texture analysis - Using a soil sieve, separate the soil particles as to size & then determine the size, weight and the percentage of each type of soil on the basis of weight.
5. Determination of PH. Take a 10 gr. sample of soil & mix 10 ml. of distilled H₂O. Then drain off excess. Use a short strip of PH paper & compare with color scale in 30 seconds.

Resource and Reference Materials
Publications:

various state publications on soil analysis
Life in the Soil, David Premer,
BSCS Lab Block
Field Ecology, Edwin Phillips,
BSCS Lab Block.
Field Guides, Peterson.

Audio-Visual:

Community:

Continued and Additional Suggested I

II. (Cont.)

With the evidence you have found are acidic or alkaline?

6. Soil mineral analysis - Test y nitrogen, sulfur, chlorine, calcium and potassium.

Determine the relationship between living organisms.

7. Bring in an agricultural agent for discussion of farm soils and the

8. If a small plot of land is available at school, the soil can be tested and proper plants for growth in that area. observations over a long period

Materials	Continued and Additional Suggested Learning Experiences
on soil emer, ips,	<p>II. (Cont.)</p> <p>With the evidence you have found, what types of soils are acidic or alkaline?</p> <p>6. Soil mineral analysis - Test your soil samples for nitrogen, sulfur, chlorine, calcium, sodium, carbon, and potassium.</p> <p>Determine the relationship between minerals and the living organisms.</p> <p>7. Bring in an agricultural agent of your county for a discussion of farm soils and the problems involved.</p> <p>8. If a small plot of land is available near the school, the soil can be tested and students can choose proper plants for growth in that plot and carry out their observations over a long period of time.</p>

ESEA Title III - 59-70-0135-1 Project I-C-E

C. 7. Factors such as facilitating transportation,
O
N economic conditions, population growth, Discipline Area S
C
E and increased leisure time have a great Subject P
P
T influence on changes in land use and Problem Orientation
centers of population density.

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: By examining reference materials, the student will find & record the amount of land & the changes of land usage occurring when the land was designated for atomic energy development.
Affective: The students will be alert to continued changes in land usage & bring to the attention of his classmates any changes having serious consequences on the environment for purposes of discussion & possible action.

I. Student-Centered in class activity
A. Classroom
1. Discussion by students of their findings & of the values of atomic energy development versus the effects on the land usage.

Skills to be Learned
Discussion
Library methods

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ions, population growth, Discipline Area Science

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changes in land use and Problem Orientation Land Use Grade 12
ulation density.

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
A. Classroom
1. Discussion by students of their findings & of the values of atomic energy development versus the effects on the land usage.

- II. Outside Resource and Community Activities
A. Library
1. The student can find many references to the development of atomic devices starting with publications of 1943. He should find these articles & record in chronological order the places that have been used, the areas of each & the previous use of the land. He can then total the amount of land devoted to changes caused by use for atomic energy.

Resource and Reference Materials	Continued and Additional Suggested
<p><u>Publications:</u></p> <p>Magazines students could use:</p> <p>Science News Letter, 8/28/43</p> <p>Life, 9/24/45</p> <p>Atlantic Monthly, 11/46</p> <p>Forum, 10/45</p> <p>Flying, 11/46</p> <p>Congressional Digest, 5/46</p> <p>Time, 1/28/46</p> <p>Nation, 8/3/46</p> <p>Science News Letter, 9/22/45</p> <p>Time, 2/18/46</p> <p>Business World, 8/3/46</p> <p>U.S. News & World Report, 2/1/46</p> <p>Newsweek, 2/18/46</p> <p>Science News Letter, 12/22/45</p> <p>Science News Letter, 12/21/46</p> <p>Life, 2/12/51 and 9/12/49</p> <p>Newsweek, 7/3/50</p> <p>Time, 7/21/52</p> <p>Science Digest, 7/52</p> <p>Scientific American, 12/52</p> <p>U.S. News & World Report, 3/26/54</p> <p>Discussion, 7/53</p> <p>New Republic, 7/26/54</p> <p>Science News Letter, 3/20/54</p> <p>Time, 5/62</p> <p>Atomic Energy pamphlet, series by the Atomic Energy Commission</p> <p><u>Audio-Visual:</u></p> <p><u>Introducing Atoms & Nuclear Energy,</u> 16 mm film</p> <p><u>Mankind and the Atom,</u> 16 mm film</p> <p><u>Community:</u></p> <p>Field trip to Point Beach Nuclear Plant or guest speaker from there</p>	

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Continued and Additional Suggested Learning Experiences

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C 7. Factors such as facilitating transportation,
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BEHAVIORAL OBJECTIVES

SUGGESTED

Cognitive: Through use of maps & photographs, students will record changes in land use & population density.
Affective: Student will identify local land use changes that are ecologically unsound, thus appreciating his natural resources.

Skills to be Learned

Calculation
 Measurement
 Read maps
 Photo information

I. Student-Centered in activity

A. Classroom

1. Many old maps of area (city, county showing roads, str highways & parking residential & indu sites, shopping ce parks, etc. are to brought to the clas
2. Make transparency lays of identical a showing changes bei
3. A transparency of township can be use calculate area devc roads, cities, etc. older maps with mos maps for linear mil roads, square miles cities, residential agricultural areas, life areas, etc.
4. Develop a list in changes, ex-residen commercial, etc. & social implications in pollution, etc. changes.

ESEA Title III - 59-70-0135-1 Project I-C-E

such as facilitating transportation,

conditions, population growth, Discipline Area Science

ed leisure time have a great Subject

Adv. Biology

on changes in land use and
population density.

Problem Orientation Land Use Grade 12

AL OBJECTIVES

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changes in land
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l land use
are ecologically
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Learned

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Many old maps of local area (city, county, state) showing roads, streets, highways & parking places, residential & industrial sites, shopping centers, parks, etc. are to be brought to the classroom.
2. Make transparency overlays of identical areas, showing changes being made.
3. A transparency of a township can be used to calculate area devoted to roads, cities, etc. Compare older maps with most recent maps for linear miles of roads, square miles of cities, residential areas, agricultural areas, wild-life areas, etc.
4. Develop a list indicating changes, ex-residential, commercial, etc. & discuss social implications, increase in pollution, etc. of these changes.

II. Outside Resource and Community Activities

A. Outside classroom

1. Visit an area of poor land utilization & development & another area that is a well planned development. Compare the differences.
2. Visitation speaker from the office of city engineer to discuss some changes being proposed by the governing bodies.

Resource and Reference Materials <u>Publications:</u>	Continued and Additional Suggeste
<p><u>Audio-Visual:</u></p> <p><u>Films:</u></p> <p><u>Transportation: Footpath to Air</u> Lane, BAVI, #1931 <u>Land Forms & Human Use, BAVI,</u> #6327</p> <p><u>Community:</u></p> <p>State Historical Society Chamber of Commerce Dept. of Natural Resources Dept. of Public Instruction</p>	

Materials

Continued and Additional Suggested Learning Experiences

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CONCEPT 8. Cultural, economic, social, and political factors determine status of man's values and attitudes toward his environment.

Discipline Area Sci

Subject Phy

Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

ESEA Title III - 59-70-0135-1 Project I-C-E

Cognitive: Students will list those career opportunities for physicists that are increasing and those that are decreasing in number.

Affective: Students will become aware of the changing employment opportunities and if needed will re-evaluate his own career intentions.

Skills to be Learned

Interviewing for specific information
Compilation of class data

Use of classified ads in newspapers and journals.

I. Student-Centered in class activity

A. Compilation of the data that members of the class have obtained from the outside resources.

B. Analysis of their information in relation to causes which may come from cultural, economic, social, and political factors.

ASP

economic, social, and
factors determine status
values and attitudes
environment.

Discipline Area Science

Subject Physics

Problem Orientation Careers Grade 12

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A. Compilation of the data that members of the class have obtained from the outside resources.
 - B. Analysis of their information in relation to causes which may come from cultural, economic, social, and political factors.

- II. Outside Resource and Community Activities
- A. Visitation and interview of university personnel.
 - B. Visitation and interview of industrial personnel.
 - C. Visitation and interview of employment agency personnel.
 - D. Classroom presentation by school's guidance counselor.

Resource and Reference Materials

Publications:

"Engineering Journal"

"Physics Today"

Local newspapers

Any scientific journals

including "Help Wanted" ads as
part of their format.

Audio-Visual:

Movie

#6066 - Careers in Engineering.

\$4.00. B.A.V.I., 1968

Community:

Local university

Local industries

Employment Agency

Continued and Additional Suggestions

e Materials

Continued and Additional Suggested Learning Experiences

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gineering.

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E environmental alterations over time.

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Discipline Area Science

Subject

Advance

Problem Orientation Pol

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Given an adverse situation (accumulating trash), students will orally solve problem, and successfully alleviate the problem using approved conservation techniques. Given a field activity, students will record, analyze and report (orally) the findings to speech class.

Affective: In speeches given to other classes, the students will positively propose solutions to the trash problem and attempt to influence the actions of the other students in school.

Skills to be Learned

Computations of wastes and analysis of data

Record, arrange, analyze and report of field trip activities

Speech skills

I. Student-Centered in class activity

A. Temporarily halt janitorial service in classroom (1 month should be sufficient).

B. When trash becomes noticeable have students categorize and weigh

C. Discussion points

a. Prevailing waste?

b. How to stem the tide of waste?

c. Can certain types of waste be re-used?

d. Is it possible, with a minimum of janitorial aid, to reverse the past month's waste accumulation?

e. Weigh trash and calculate amount of trash per student.

ESEA Title III - 59-70-0135-1 Project I-C-E

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Discipline Area Science

Subject

Advanced Biology

Problem Orientation Pollution

Grade 12

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

- A. Temporarily halt janitorial service in classroom (1 month should be sufficient).
- B. When trash becomes noticeable have students categorize and weigh
- C. Discussion points
 - a. Prevailing waste?
 - b. How to stem the tide of waste?
 - c. Can certain types of waste be re-used?
 - d. Is it possible, with a minimum of janitorial aid, to reverse the past month's waste accumulation?
 - e. Weigh trash and calculate amount of trash per student.

II. Outside Resource and Community Activities

- A. Because the activity would invariably result in a conclusion that paper is the most common waste:
 - a. Visit local or nearby paper mill to study energy needed to produce monthly class consumption of paper. (Multiply by classes in school by schools in city by schools in the state)
 - b. Source of wood used to produce paper
 - c. Pollution produced by paper mill.
 - d. Recycling possibilities
- B. Field trips to any of the following areas would re-enforce the concept:
 - a. Pulp forest-managed and mismanaged if possible.
 - b. Recycling mill

(cont.)

Resource and Reference Materials
Publications:

Teaching for Survival, Mark Terry,
Friends of the Earth/Ballantine
Book, New York, 1971
Man's Impact on Nature, J. A.
Lauwerys, Garden City, N.J.,
1969, Natural History Press
Speaking By Doing, National
Textbook Co., Skokie, Ill.

Audio-Visual:

Garbage, 15 min., CESA #9
Make slide--case study
Bulletin board display on
trash

Community:

Speech teacher as resource
and organizing aide

Continued and Additional Suggested
II. (cont.)

c. Public incinerator, dump, 1
d. Oral reports in speech clas
to noninvolved classes)

C. Use a camera to prepare a slide
trash accumulated

ence Materials Continued and Additional Suggested Learning Experiences
II. (cont.)

al, Mark Terry,
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le, Ill.

- c. Public incinerator, dump, landfill
- d. Oral reports in speech classes (presented to noninvolved classes)

C. Use a camera to prepare a slide record of the trash accumulated

ESA #9
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T the individual right of others.

Discipline Area Science

Subject

Physics

Problem Orientation En

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Students will calculate ratios on local area maps of water turbidity using a light meter and will identify causes of the turbidity.
Affective: Given an out of class assignment to observe local bodies of water, students will demonstrate alertness to uses of stream water that may add to its turbidity and to support those activities that will reduce turbidity already present.

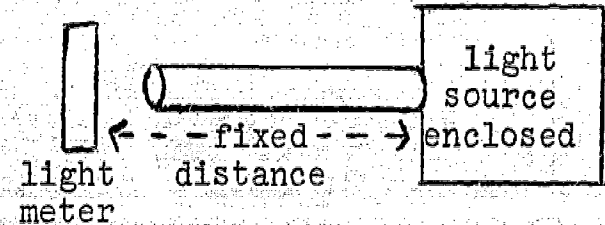
I. Student-Centered in class activity

A. Classroom

1. The students will construct a tube that can be used as a water sampler. The tube is to be transparent at both ends.
2. The first reading is to be taken in the classroom using any available high power light source, distilled water & a light meter normally used for photography.
3. Follow outside activities to finish project.

Skills to be Learned

Use of light meter
Locating sites on maps
Preparing hypotheses



ESEA Title III - 59-70-0135-1 Project I-C-E

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Discipline Area Science

Subject Physics

Problem Orientation Energy Grade 12

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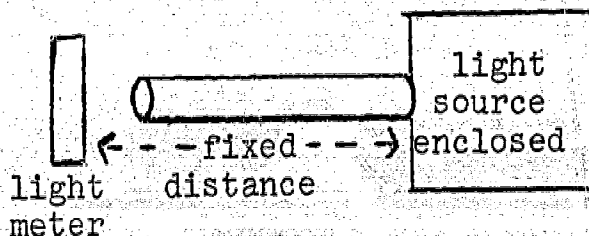
SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class activity

A. Classroom

1. The students will construct a tube that can be used as a water sampler. The tube is to be transparent at both ends.
2. The first reading is to be taken in the classroom using any available high power light source, distilled water, & a light meter normally used for photography.
3. Follow outside activities to finish project.



II. Outside Resource and Community Activities

A. Outside of classroom

1. At a nearby stream that flows through an extensively used area, the students collect samples at sites along the length of the stream. If a map is available, the sample locations should be identified on the map.
2. Each sample is placed on the tube & the light meter reading used to calculate a ration of transmitted light compared to that of distilled water.
3. Students attempt to hypothesize the causes of any changes in the meter readings making use of the known activities taking place along the stream.
4. Have representative of local industry - making use of stream for disposal of used water.

Resource and Reference Materials
Publications:

The Principles of Light & Optics,
R. A. Wheadon; Longmans, Green
& Co. Ltd., 1968

Audio-Visual:

Local area maps

Community:

Continued and Additional Suggested

Materials	Continued and Additional Suggested Learning Experiences
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Optics,
Green

[Faint, illegible text in the main body of the table, likely bleed-through from the reverse side of the page.]

PROJECT I-C-E

Episode Evaluation Form
(Reproduce or duplicate as ne

In commenting on each episode used in your class, you may use the following format. Please feel free to adapt it and add more pages. Include both positive and negative comments.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form

(Reproduce or duplicate as needed)

When an episode is used in your class, you may wish to duplicate this suggested form to adapt it and add more pages. Let us know all your critiques and suggestions, both positive and negative.

ves

Experiences

Activity Activities

& Reference Materials
(Suggestions & comments)

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Discipline Area Science

Subject Science

Adequate

Problem Orientation Water Supply Grade 2

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Prepare a display of different types of water contaminators.
 - a. salt, sugar, food coloring, fertilizer, oil, detergent, soil, etc.
 2. Two groups labeled "Clean Environment" and "Polluted Environment." The "We Care" group changes water in one fish bowl with 2 fish, feed fish regularly, & keep environment clean. The "We Don't Care" group keeps a record of the elements, such as dirty nail, dust, mud, dead leaf, chicken bone, detergent suds, gum introduced in other fish bowl with 2 fish. Observe murkiness, foul air, lethargic fish, eventual death of fish.

- II. Outside Resource and Community Activities
1. Visit local stream, pond or fish hatchery to observe plants and animals in polluted and unpolluted water.
 2. Hear talk by conservationist, Water Dept. Representative or chemist about purification of water (optional).
 3. Trip to waterworks or sewage plant.

Resource and Reference Materials
Publications:

Books:

Science Experiments with Water,
Sam Rosenfeld, Harvey House,
Inc, N. Y.

What is Water by Adaline Hagaman,
Benefic Press, Chicago.

Working with Water by E.A. Catherall,
Albert Whitman & Co., Chicago.

Let's Go to Stop Water Pollution
by Michael Chester.

Water Fit to Use by Carl Walter
Carlsen.

Water for your Community by
Edward Rodlauer.

Water: Our Most Valuable Natural
Resource by Ivah Green.

The Clean Brook by Margaret
Farrington Bartlett.

Rivers by Delia Goetz.

Audio-Visual:

5 study prints-Weather Instruments

5 study prints-Weather Phenomena

Movies:

The Ocean, A First Film, no. 4176,
Green Bay Instructional Media
Center (Bailey)

Living Things in a Drop of Water,
no. 4187, Green Bay Instructional
Media Center (Encyclopedia
Britannica)

Weather for Beginners, no. 4132
Green Bay Instructional Media
Center (Coronet)

Water and What It Does,
Encyclopedia Britannica, Inc.

(cont.)

Continued and Additional Suggested Le

Audio-Visual: (Cont.)

Filmstrips:

The Oceans

The Water Cycle

Water in our Lives

Climate and Weather

How Weather Affects Us

All from Herbert E. Budek Co., 19
Picture discussion kit: free

c/o American Petroleum Institute

1271 Avenue of Americas

New York, N. Y. 10020

Community:

C 5. An adequate supply of clean air is
 O -
 N essential because most organisms
 C -
 E depend on oxygen, through respiration
 P -
 T to release the energy in their food.

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 Problem Orientation Clea

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EX
<p><u>Cognitive:</u> The student will list, orally or written, the physical effects of animals living in clean and unclean air.</p> <p><u>Affective:</u> Each child will voluntarily name two places or situations where he feels either animals or people have created an unhealthy air situation and defend his position.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Discuss how some animals in winter breathe underground. Air is present in soil. Snow acts as insulation (blanket.) If this blanket is compacted, such as with a snowmobile, animals no longer have enough air to breathe. 2. Read & discuss about the various animals who have moved from concentrated populations with heavy air pollution to deserts and more sparsely inhabited areas. Display on bulletin board. 3. Make a list of all the smog-producing things that threaten our clean air. Children make display on bulletin board. <p>II. C</p>
<p><u>Skills to be Learned</u></p> <p>Recognize many of our endangered species of animals.</p>	

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Discipline Area

Science

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Subject

Animals

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Problem Orientation

Clean Air

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Discuss how some animals in winter breathe underground. Air is present in soil. Snow acts as insulation (blanket.) If this blanket is compacted, such as with a snowmobile, animals no longer have enough air to breathe.
2. Read & discuss about the various animals who have moved from concentrated populations with heavy air pollution to deserts and more sparsely inhabited areas. Display on bulletin board.
3. Make a list of all the smog-producing things that threaten our clean air. Children make display on bulletin board.

II. Outside Resource and Community Activities

Resource and Reference Materials
Publications:

Continued and Additional Suggested

Books:

The Unclean Sky: A Meteorologist
Looks at Air Pollution, by Lewis
Batton, 1966, Doubleday and Co.
Dangerous Air by Lucy Kavalier,
1967, by John Day Co. N. Y.
About the Nature of Air by Harry
Sootin, 1967, W.W. Norton & Co.
America's Endangered Wildlife by
George Laycock, 1969, W.W.
Norton & Co., N. Y.

Magazines:

Ranger Rick, National Wildlife
Association, Dec. 1970

Audio-Visual:

Filmstrips:

Eye Gate

X77 - Urban Ecology

X77D - A Park Pond

X77E - A Grass Yard

X77C - A Park

Budek Company

Freshwater Community

Seashore Community

Community:

Materials	Continued and Additional Suggested Learning Experiences
<p>eteorologist n, by Lewis ay and Co. Kavaler, N. Y. r by Harry rton & Co. ildlife by W.W.</p>	
<p>Wildlife 0</p>	

C 6. Natural resources are not equally

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N distributed over the earth or over

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E time and greatly affect the geographic

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T conditions and quality of life.

Discipline Area Science

Subject

Science

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Problem Orientation Con

BEHAVIORAL OBJECTIVES

Cognitive: List 4 important ways forests play an importance to the quality of our life & the ecosystem.
Affective: The children will share ideas on how they can use forest products in such a way as to conserve more trees. e.g. Use 2 sides of writing paper. Use 1 paper towel before taking second. At home, use cloth towel instead of paper towels.

Skills to be Learned

Map study
 Brainstorming
 Collection-categorization
 Committee work

SUGGESTED LEARNING

- I. Student-Centered in class activity
 - A. Class activity
 1. Committee collection of brainstorming on uses of wood.
 2. List ways wood is used in room.
 3. Ranger Rick's article read & discussed on danger of depleted forests.
 4. Students report on camping in forest areas.
 5. Discuss animal's distress when forest home is destroyed. Dramatization may also be used.
 6. List substitute materials (man-made) that can be used for wood products.
 7. List what would happen if we ran out of lumber for building materials.

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Discipline Area Science

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Forest

Problem Orientation Conservation Grade 2

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Class activity

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of brainstorming on
uses of wood.
2. List ways wood is used
in room.
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read & discussed on
danger of depleted
forests.
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tress when forest home
is destroyed. Drama-
tization may also be
used.
6. List substitute materials
(man-made) that can be
used for wood products.
7. List what would happen
if we ran out of lumber
for building materials.

II. Outside Resource and
Community Activities

A. Collect pictures of
forests. If location
is convenient-plan a
visit.

Materials	Continued and Additional Suggested Learning Experiences
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C 7. Factors such as facilitating transportation,
O economic conditions, population growth, Discipline Area Science
N and increased leisure time have a great Subject Science
C influence on changes in land use and Problem Orientation Land Use
P centers of population density.

BEHAVIORAL OBJECTIVES

Cognitive: Students will be able to make correct choices from a list of ten statements regarding changes in land use & population density.
Affective: The children will have their own plans, which will include what to do in park or public areas. e.g. No swimming; polluted water; wild animals; do not feed bear.

Skills to be Learned

Interviewing
Map study skills
Illustrations
Dramatization

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 - A. Classroom
 1. Show beautiful flower. Ask them to give some opinions on it. Give out paper & tell them to draw a picture of it. WAIT - Teacher then steps on the flower. Now who would like to draw a picture? What happened? Discuss what happens to the ecosystem when many people come to a wild life area for a summer vacation or holiday. (Land abuse)
 2. Make a bulletin board of beach scene with pigs in bathing suits, under sun umbrellas, cans all over with other garbage. Littered beach. Which are you? or other caption - Increase Leisure Time.
 3. Dramatize large group situations: crowded elevators, dept. sales, sidewalk sales. Draw pictures of crowded highways. Stress population growth. (cont.)

as facilitating transportation,

ions, population growth, Discipline Area Science

leisure time have a great Subject Science

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OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class activity

A. Classroom

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Ask them to give some opinions on it. Give out paper & tell them to draw a picture of it.

WAIT - Teacher then steps on the flower. Now who would like to draw a picture? What happened? Discuss what happens to the ecosystem when many people come to a wild life area for a summer vacation or holiday.

(Land abuse)

2. Make a bulletin board of beach scene with pigs in bathing suits, under sun umbrellas, cans all over with other garbage. Littered beach. Which are you? or other caption - Increase Leisure Time.

3. Dramatize large group situations: crowded elevators, dept. sales, sidewalk sales. Draw pictures of crowded highways. Stress population growth. (cont.)

II. Outside Resource and Community Activities

A. Water lawn; teacher walk across. Now children walk across. Why did you get the grass muddy? What else happened? Why? What would happen if 100 people would walk here? Stress population growth.

B. Children may interview parents about what they do in their free time. Report to class. Class list best ways of using free time for adults.

C. Visit facilities available in town made for people with leisure time.

D. Show slides of vacation trip & the special facilities provided for tours. How was land changed?

Resource and Reference Materials
Publications:

Books:

Where is Home? McClellan, Black,
Norris, pub. Houghton Mifflin
Once There Was a Tree, Phyllis
Busch, World pub.
The Little House, Bates, Virginia,
pub. Houghton Mifflin, 40p.

Audio-Visual:

Filmstrips:

Wis. Vacationland, 6063, BAVI,
Wis. Interstate Highway, 15 min.,
Color

1931 BAVI, Transportation: Foot
Path to Air Lane, 16 min., Color

0241, Better Use of Leisure Time,
11 min., Coronet, BAVI

Movie:

Woodland Manners, Color, BAVI,
21 min., United World

Community:

Continued and Additional Suggested Learning

I. (cont.)

4. Children inquire what time parents and the time they go to work. Why have to work at night?
5. Discuss solutions to the lack of highways. More roads, people ride closer to work.
6. Students indicate on the map where has gone on vacations or where they lived. Mark all locations. Locate brochures and correspond to map locations.
7. Illustrate conservation signs: Stop no hunting; no trespassing; private etc. Discuss how ecosystem is affected when men break laws, how affected when

Materials	Continued and Additional Suggested Learning Experiences
<p>lack, lin lis rginia, . VI, 5 min., Foot Color Time, VI,</p>	<p>I. (cont.)</p> <ol style="list-style-type: none"> 4. Children inquire what time parents finish work and the time they go to work. Why do some parents have to work at night? 5. Discuss solutions to the lack of sufficient highways. More roads, people ride together, live closer to work. 6. Students indicate on the map where their family has gone on vacations or where their family once lived. Mark all locations. Locate vacation brochures and correspond to map locations. 7. Illustrate conservation signs: Stay off of grass; no hunting; no trespassing; private; no littering; etc. Discuss how ecosystem is affected when few men break laws, how affected when many break law.

C 3. Cultural, economic, social, and
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 N political factors determine status
 C
 E of man's values and attitudes
 P
 T toward his environment.

Discipline Area _____ Scien
 Subject _____ Scien
 Resou
 Problem Orientation Usage

BEHAVIORAL OBJECTIVES

Cognitive: From long list of animals; underline wildlife. Draw 4 wildlife homes and where found.

Affective: Aware that man has to improve his actions toward wildlife; aware man can be an aid & not a hindrance toward the life of wildlife as supports his readings and news.

Skills to be Learned

Mobile making
 Collage
 Nesting boxes

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

II. Co

1. Motivation of picture of father & son or family looking at wild animals in zoo. Children tell story. Teacher may suggest Father is bragging about killing deer, bear, etc. How ideas are handed down to kill is all right. Killing for the thrill of it.

2. Discuss what & why certain animals are considered pests. What pests are found in your community? Discuss methods of reducing or controlling pests. What good animals use these pests as food? Discuss cases where an animal is considered a pest by some, and not by others. Mobile or collage on pests & desired animals.

3. Start class project to increase population of animals that can live successfully in your area.

4. Set up display about different ways to attract animals to an area. Consider if all animals would be desired in area.

5. What laws must sportsmen abide?

(Cont.)

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ACTIVES

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class activity

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4. Set up display about different ways to attract animals to an area. Consider if all animals would be desired in area.
5. What laws must sportsmen abide?

II. Outside Resource and Community Activities

(Cont.)

Resource and Reference Materials
Publications:

Books:

Flying Free by Brodthorb, Rand-
McNally, 1964
At Home in Its Habitat by Bush,
World. Pub.
Patterns of Nature by Baker,
Doubleday, 1967.
Ranger Rick magazine
c/o National Wildlife Fed.

Audio-Visual:

Films:

Helpful & Harmful Animals of
the City #11729, Encyclopedia
Britannica.
Animal Habitats, color, 11 min.,
BAVI, #1819.
Animal Homes, 11 min., EBF, BAVI
#3268.
pictures for bulletin board

Community:

fish hatchery
game farm
conservation officer

Continued and Additional Suggest

I. (Cont.)

6. How has man changed the
of the wild do not reprodu
pollution of highways, air
7. Contrast by means of cha
& Fishing. Would anyone ob
are the good & bad of hunt
to hunting American eagle,
8. Introduce animal problem
extinct. Name animals found
once roamed freely. (Buffa
whales, etc.) Refer to iss
9. How alike - How different
kitten - tiger
parent - game warden
10. Discuss how wildlife help
control weeds & rodents -
wildlife - beautiful and i
11. Make chart or bulletin bo
Protect wildlife homes -
food and shelter
12. Avoid killing or annoyin
13. Keep wild pets rarely, a
return to where they were
14. Some insects are helpful
(bees, dragonflies, ladybu

Source Materials	Continued and Additional Suggested Learning Experiences
<p>horb, Rand-</p> <p>at by Bush,</p> <p>y Baker,</p> <p>e Fed.</p> <p>imals of</p> <p>cyclopedia</p> <p>or, 11 min.,</p> <p>., EBF, BAVI</p> <p>board</p>	<p>I. (Cont.)</p> <p>6. How has man changed the environment so animals of the wild do not reproduce adequately? Ex.-noise pollution of highways, air pollution, hunters.</p> <p>7. Contrast by means of chart: Good & Bad of Hunting & Fishing. Would anyone object to hunting ants? What are the good & bad of hunting deer? Who would object to hunting American eagle, whooping crane?</p> <p>8. Introduce animal problems of animals becoming extinct. Name animals found rarely in area that once roamed freely. (Buffalo, bear, eagle, seals, whales, et .) Refer to issues of "Ranger Rick."</p> <p>9. How alike - How different - pictures kitten - tiger wild bird - parakeet parent - game warden</p> <p>10. Discuss how wildlife helps: control weeds & rodents - diseases & insects in forest wildlife - beautiful and interesting to watch</p> <p>11. Make chart or bulletin board to help wildlife: a. Protect wildlife homes - plant trees & shrubs for food and shelter b. Avoid killing or annoying small living things. c. Keep wild pets rarely, after few day of proper care, return to where they were found. d. Some insects are helpful and should not be destroyed (bees, dragonflies, ladybugs, etc.)</p>

C 10. Short-term economic gains may
O
N produce long-term environmental
C
E losses.
P
T

Discipline Area Science
Subject Science
Problem Orientation Land

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

Cognitive: Children will construct a diarama of their own community showing parks, shopping centers, homes, streets, etc.
Affective: Children will choose one site in their community they would like to change. Tell how & why.

Skills to be Learned
Survey community
Planting
Drawing
Discussion

- | | |
|---|----|
| I. Student-Centered in class activity
A. Classroom
1. Make a survey of the different ways your community uses space.
Example - Parks, roads, buildings, man-made lakes, parking lots, dumps, etc.
2. How do these uses change the area? How would a merchant feel about the use? nature lover? farmer?
3. Consider effects of land change on plants, animals, rainfall, wind patterns, sunlight, etc.
4. Draw an ideal school ground or park that they would like to see. | II |
|---|----|

conomic gains may

environmental

Discipline--Area Science

Subject Science

Problem Orientation Land Use Grade 2

ACTIVITIES

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why.

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Make a survey of the different ways your community uses space.
Example - Parks, roads, buildings, man-made lakes, parking lots, dumps, etc.
2. How do these uses change the area? How would a merchant feel about the use? nature lover? farmer?
3. Consider effects of land change on plants, animals, rainfall, wind patterns, sunlight, etc.
4. Draw an ideal school ground or park that they would like to see.

II. Outside Resource and Community Activities

A. Out of classroom

1. Bring historical pictures of community & how area changed.
2. Visit areas of historical pictures & note comparisons.
3. Tour area & discuss use of land: land fill, parking lots, farm, new homes being landscaped, etc.
4. Arbor Day plantings used to create shade, wildlife, noise buffers, or recreation.
5. Visit natural forest; emphasize some trees must be cut down to leave room for the new or young trees & note how seedlings are started. Perhaps a conservationist or consulting forester will lead the tour.

Resource and Reference Materials	Continued and Additional Su
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p> <u>Miguel's Mountain</u>, Bill Binzen, published by Coward-McCann <u>Just Right</u>, Lillian Moore, Parents Magazine <u>From Field to Forest</u>, World Pub., Lawrence Pringle <u>Ranger Rick</u>, National Wildlife Once There Was a Tree, World Pub. <u>The Little House</u>, Virginia Bates, Houghton Mifflin </p> <p><u>Audio-Visual:</u></p> <p><u>Films:</u></p> <p> <u>The Tree House</u>, UWGB - CESA Office free of charge <u>Our Vanishing Lands</u>, McGraw Hill <u>The World Around Us</u>, NBC, 25 min. McGraw-Hill, #672406 </p> <p><u>Community:</u></p> <p> Historical Society Older members of the community Farmer or extension officer Local, county or district forester </p>	

C 11. Individual acts, duplicated
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 N or compounded, produce significant
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 E environmental alterations over time
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 T

Discipline Area Science
 Subject Science
 Problem Orientation Problem

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Children will write an experience of how a child corrected a foolish habit that was detrimental to the visual enjoyment of his environment.</p> <p><u>Affective:</u> During the following week the waste-paper basket will again go unemptied. At the end of the week the children will again divide the paper into fully used and that not fully used and see how it compares with the previous week. Shall we persist in saving of paper?</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Picture drawn by students of park facilities littered. Discuss solutions. Ex. <ol style="list-style-type: none"> a. Everyone pick up their own. b. Picnic area have special custodian c. Everyone pick up area around their tables, whether or not their rubbish. 2. Put into practice in classroom; stewardship-cleaning area of room, even if they are not responsible. 3. Arrange with custodian not to remove wastepaper for one week. Have children discover the amount wasted in one week. Have the children in a committee divide the paper thrown away that have not been fully used from the fully used paper. Have each list conclusions. 4. Chart in contrasting amounts of water used: shower-tub, dishwasher-sink, ring washer-automatic washer.
<p><u>Skills to be Learned</u> Committee work Measurement in gallon</p>	

ESEA Title III - 59-70-0135-1 Project I-C-E

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Discipline Area Science

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Subject Science

Problem Orientation Pollution

Grade 2

L OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class
activity

1. Picture drawn by students
of park facilities littered.
Discuss solutions. Ex.
 - a. Everyone pick up their own.
 - b. Picnic area have special
custodian
 - c. Everyone pick up area
around their tables,
whether or not their
rubbage.

2. Put into practice in class-
room; stewardship-cleaning
area of room, even if they
are not responsible.

3. Arrange with custodian not
to remove wastepaper for
one week. Have children
discover the amount wasted
in one week. Have the
children in a committee
divide the paper thrown away
that have not been fully used
from the fully used paper.
Have each list conclusions.

4. Chart in contrasting amounts
of water used: shower-tub,
dishwasher-sink, ringer washer-
automatic washer.

III. Outside Resource and
Community Activities

earned

gallon

Resource and Reference Materials
Publications:

Continued and Additional

Audio-Visual:

Filmstrip:

What do You Think About Helping
Your Community?, #131-6,
Imperial Film Co. pub.

How do You Feel About Animals
and Plants?, -Value judgments,
#130-3, Imperial Film Co.
pub.

Films:

Litterbug, (C), 10 minutes,
4708, \$3.50, BAVI, Avis Pub.
The Litterbug, by Walt Disney,
8 minutes.

Community:

Bottles, paper or aluminum
drive for recycling purposes.

Interviews in blocks of each
student home on number of
showers, dishwashers,
automatic washers, etc.

Field trip to see areas
classified as eyesores. How
could individuals change or
bring about change?

Materials	Continued and Additional Suggested Learning Experiences
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Helping

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C 12. Private ownership must be re-
 O
 N garded as a stewardship and should
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 E not encroach upon or violate
 P
 T the individual right of others.

Discipline Area Science
 Subject Science
 Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> The student will list the 6 kinds of simple machines. Classify 6 more as to the need for private or public ownership, and the encroachment upon individual rights by their usage.</p> <p><u>Affective:</u> The students will speak up against the misuse of property.</p>	<p>I. Student-Centered in class activity</p> <p>A. Identify the 6 simple machines, and find examples at home or at school.</p> <ol style="list-style-type: none"> 1. lever - seesaw 2. inclined plane - ramp or steps 3. wedge - ax, knife, needle 4. wheel - bicycle, doorknob, pencil sharpener 5. screw - jack, screw piano stool 6. pulley - flag pole, pulley <p>B. Study how man has harnessed nature by use of windmill, water wheel, turbine to do work for us.</p> <p>C. Find pictures of complicated modern machines and discover that they are composed of 2 or more of the 6 basic machines. Make a display on bulletin board.</p> <p>D. Find examples of 6 complicated machines that are violating the rights</p>
<p><u>Skills to be Learned</u></p> <p>Identify 6 simple machines. Discuss 6 more complicated machines as to violation or non-violation of individual's rights.</p>	

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right of others.

Discipline Area Science

Subject Science

Problem Orientation Simple Machines

Grade 2

OBJECTIVES

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their usage.
Students will
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

- A. Identify the 6 simple machines, and find examples at home or at school.
 - 1. lever - seesaw
 - 2. inclined plane - ramp or steps
 - 3. wedge - ax, knife, needle
 - 4. wheel - bicycle, doorknob, pencil sharpener
 - 5. screw - jack, screw piano stool
 - 6. pulley - flag pole, pulley
- B. Study how man has harnessed nature by use of windmill, water wheel, turbine to do work for us.
- C. Find pictures of complicated modern machines and discover that they are composed of 2 or more of the 6 basic machines. Make a display on bulletin board.
- D. Find examples of 6 complicated machines that are violating the rights

II. Outside Resource and Community Activities

- A. Have county extension agent, naturalist, or conservationist speak to class about the air, land and water pollution from the misuse of machines, such as cars, or gasoline-using engines or rockets, atomic energy plants, etc.

(cont.)

Resource and Reference Materials

Publications:

- Let's Find Out About Wheels
Martha and Charles Sharp
Franklin Watts, Inc., New York
- Big Book of Real Building and Wrecking Machines
George Zaffo
Grosset & Dunlap, New York
- Doing Work
Glenn Blough
Row, Peterson Co.
- How and Why Wonder Book of Machines
Jerome Notkin and Sidney Gulkin
Wonder Books, New York
- Motors and Engines and How They Work
Harvey Weiss
H.W. Wilson Co., 1969

Audio-Visual:

-Filmstrips

- How We Use Machinery
Herbert E. Budck Co., 1967
- How We Use Wheels
Herbert E. Budck Co., 1967

Finding Out About Simple Machines Society for Visual Education

-Films

- Simple Machines
Encyclopedia Britannica
- How Simple Machines Make Work Easier (Coronet)
- Machines Do Work
McGraw-Hill Book Co. (11 min.)
- Moving Things on Land
McGraw-Hill Book Co. (11 min.)

Continued and Additional Suggest

Student- entered in class activ

of thers. Discuss and fi
mi use, and see if any ru
passed to prevent their e
rights.

1. auto
2. crane
3. snowmobiles
4. trucks

Community:

Materials

Continued and Additional Suggested Learning Experiences

is

Student-Centered in class activity (cont.)

Work
and

of others. Discuss and find information about their misuse, and see if any rules or laws have been passed to prevent their encroachment on individuals' rights.

1. auto
2. crane
3. snowmobiles
4. trucks

f Machines
Gulkin

w They Work

967

967
e Machines
ation

e Work

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11 min.)

Community:

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish to use the following format. Please feel free to adapt it and add more pages. Let us hear your comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

on each episode used in your class, you may wish to duplicate this suggested
feel free to adapt it and add more pages. Let us know all your critiques
negative and positive.

Objectives
re:

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eloped

Learning Experiences
:

& Community Activities:

Resource & Reference Materials
(Suggestions & comments)

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Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 3

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
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Robert Warpi
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C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

ARY PROGRAM FOR ENVIRONMENTAL EDUCATION

REA Science GRADE 3

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ls in CESA's 3-8-9

et

sconsin 54301

8

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is ready. If over a hundred teachers, year long meetings, a summer workshop, and ecologists, this guide means realistic, developed aid for you. Please read the preface which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are designed to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your students, you can adapt, adopt, or use. By design, the range of suggestions is wide. Adaptation and usage are even wider. Many episodes are self-contained. Others can be changed in part or developed more keenly over a few possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning experiences. The reasons are simple. No guide has all the answers and no guide unless viewed in the context of your classroom situation. Thus, be sure to give it a triple reading, check over the resources listed, make modifications, prime your students, and seek help. The Project personnel and teaching knowledge page stand ready to aid your efforts. Feel free to ask for help.
4. The Project Resource Materials Center serves all CESA 3, 8, and 9 districts. We will send available materials pre-paid. Call for any help or visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library for new Center materials. Please offer suggestions, comments, or advice--a service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch ideas. Suggestions on the episode pages or use the attached evaluation form collected in late May next year and will be used in our revisions. We welcome reactions and suggestions--negative and positive. Please note that in the episodes may refer to specific, local community resources cases, individual school districts and teachers will have to adopt substitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--survival-- Creation's beauty and complexity--often noted as the work of a generation and human energy to save. A year's work by a hundred of your fellow ecologists. Without you, their work will crumble, and so might we all. Let us live to think, feel, and act in harmony with our world.

Editorial

1. Cognitive means a measurable mental skill, ability, or process
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels a cognitive process)
4. EPA - Environmental Problem Area

PREFACE

Students about their environment, help is ready. Thanks to the efforts of a year long meetings, a summer workshop, university consultants and a realistic, developed aid for you. Please note the following ideas for writers in writing and editing this guide. The episodes are designed--at appropriate instances--in nature and the episodes are designed--at appropriate instances--for logical course content. Offers suggestions. Since you know your students best, you decide what to do. By design, the range of suggestions is wide; your chances for experience even wider. Many episodes are self-contained, others open-ended, still in part or developed more keenly over a few weeks. These built-in opportunities to explore.

Try the episodes and suggested learning experiences but please pre-plan simple. No guide has all the answers and no curriculum will work without context of your classroom situation. Thus, before trying an episode, check over the resources listed, make mental and actual notes, and seek help. The Project personnel and teachers listed on the acknowledgment are ready to aid your efforts. Feel free to ask their help in pre-planning. The Materials Center serves all CESA 3, 8, and 9 area schools--public and private--with available materials pre-paid. Call for any help, materials, or to

Get ICE Bibliography in your school library for available Resource. We offer suggestions, comments, or advice--at any time--so that this can help each other.

Use the guide by reacting to it with scratch ideas, notes, and extended episode pages or use the attached evaluation format, which will be collected at year end and will be used in our revisions. We sincerely want your comments--negative and positive. Please note that some resources listed refer to specific, local community resources or conditions. In such cases, school districts and teachers will have to adopt local or available substitutes. Terms pertinent to the episodes is below.

Experts have simplified the issue--survival--yours, mine, our students, the complexity--often noted as the work of a genius--will take our genius away. A year's work by a hundred of your fellow teachers is a saving grace. Their work will crumble, and so might we all--literally. Instead, feel, and act in harmony with our world.

Editorial Board

Measurable mental skill, ability, or process based on factual data. No student attitudes, values, and feelings.

Performance Will Include (labels a cognitive or mental performance.)
Problem Area

ACKNOWLEDGEMENTS: The following teachers and consultants participated in the development of the Supplementary Environmental Education Guide.

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 Sister An
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 Joyce Mat
 Richard M
 Gloria Mo
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 Ruth Wind
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 Billie Feichtinger, Green Bay
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 Thomas Weyers, Cathedral
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 James Wiza, De Pere
 John Torgerson, Kewaunee
 Benjamin Roloff, Howard-Suamico
 Greg Schmitt, Cathedral
 John DeWan, Green Bay
 Emmajean Harmann, Sevastopol
 Ray Gantenbein, Green Bay
 David Bartz, Sturgeon Bay
 John Hussey, Green Bay
 Sister Barbara, St. Bernard

Ednajean Purcell, OSU
 David West, Lawrence U.

Robert Cook, UWGB
 Dennis Bryan, UWGB

C 1. Energy from the sun, the basic source

O

N of all energy, is converted through

C

E plant photosynthesis into a form all

P

T living things can use for life pro-
cesses.

Discipline Area Science

Subject Plants

Problem Orientation Energy

BEHAVIORAL OBJECTIVES

Cognitive: List 3 things necessary for plants to make their own food. Draw a picture of different plants-plants we eat, play on, scenic beauty, etc.
Affective: Through the participation in experiments he will support the idea of the three basic (soil, water, sun) things that cause photosynthesis.

Skills to be Learned

Observation of plants
Record observations of plants
Identify things necessary for plant growth

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Get 2 plants (same kind). Don't water the plants for 3 days. Cover the soil of one plant with waxed paper & water both plants for 2 weeks. Then compare them to see which plant looks as if it can make food.

B. Mineral experiment to show how water & minerals get up into a celery stem & leaves. Cut plant's stem away from roots. Put the cutting in a glass of colored water for a day. Observe into which part of a growing plant the water & minerals go first.

C. Use identical plants. Cover one with paper bag, but continue watering. Place in dark room. After 3 weeks uncover. Bring out the idea that one plant will die without sunlight.

un, the basic source

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into a form all Subject Plants
e for life pro- Problem Orientation Energy use Grade 3
cesses.

IVES	SUGGESTED LEARNING EXPERIENCES	
ngs o raw play . e i- n)	<p>I. Student-Centered in class activity</p> <p>A. Get 2 plants (same kind). Don't water the plants for 3 days. Cover the soil of one plant with waxed paper & water both plants for 2 weeks. Then compare them t to see which plant looks as if it can make food.</p> <p>B. Mineral experiment to show how water & minerals get up into a celery stem & leaves. Cut plant's stem away from roots. Put the cutting in a glass of colored water for a day. Observe into which part of a growing plant the water & minerals go first.</p> <p>C. Use identical plants. Cover one with paper bag, but continue watering. Place in dark room. After 3 weeks uncover. Bring out the idea that one plant will die without sunlight.</p>	<p>II. Outside Resource and Community Activities</p> <p>A. Visit a vacant lot or park to observe plants growing there.</p>
f sary		

Resource and Reference Materials
Publications:

Books:

Plants for Pots, by D. X. Fenton.

The Tomato and Other Fruit

Vegetables, by Millicent E.

Selsam.

The Indoor and Outdoor Grow-it

Book, by Samm Sinclair Baker

(A book of gardening projects)

Survival Under the Sun, by Lewis

Wayne Walker.

Once There Was a Tree by Phyllis S.

Busch.

Audio-Visual:

Movie:

Living and Non-living Things,

11 min., color, Coronet

Filmstrips:

Plants That Provide Food (581)

Photosynthesis (581 Ph)

A Grass Yard (574.5)

A Park (574 Pa)

A Park Pond (574 Pa)

All by Herbert E. Budek, Inc.

Jamaica, New York

Community:

Continued and Additional Suggest

Materials

Continued and Additional Suggested Learning Experiences

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Grow-it
Baker
projects)
by Lewis

y Phyllis S.

things,
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d (581)

Inc.

2. All living organisms interact among themselves and their environment, forming an intricate unit called an ecosystem.

Discipline Area Science

Subject Animals

Problem Orientation Ecosystem

ESEA Title III - 50-70-0125-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> Children should recognize pictures of 5 wild animals common to our area, and their primary food & native habitat. Define 2 main differences between the wild & domestic animals.</p> <p><u>Affective:</u> Animals differ in their habits & habitats. Food, diseases & structural changes caused by man or weather can cause an imbalance in the delicate ecosystem. Child will become concerned about his reaction to this information.</p>	<p>I. Student-Centered in class activity</p> <p>A. Class activity</p> <ol style="list-style-type: none"> 1. Look up & write reports on animals in various environments, ex. the desert, the sea, the woods, the jungle. Make a large wall chart when your research is completed. 2. Define vertebrates & invertebrates. List as many as they can & compare their existing habitats. 3. Form a Bird Watchers Club, where you collect pictures, study & mostly observe different birds & their habitats. 4. Play a matching game or bingo game where you have cards with animal pictures, foods they eat, & natural habitat. 5. Read <u>Charlotte's Web</u> by E. B. White. Discuss with class the spider & survival in its habitat. 6. Class builds a bird feeder for winter & places it where they can watch bird
<p><u>Skills to be Learned</u></p> <p>Writing a report of favorite animal</p> <p>Collect pictures of animals in their natural habitats</p> <p>Record number of animals & birds seen</p>	<p>(cont.)</p>

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Problem Orientation Ecosystem Grade 3

ACTIVITIES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Class activity

1. Look up & write reports on animals in various environments, ex. the desert, the sea, the woods, the jungle. Make a large wall chart when your research is completed.
2. Define vertebrates & invertebrates. List as many as they can & compare their existing habitats.
3. Form a Bird Watchers Club, where you collect pictures, study & mostly observe different birds & their habitats.
4. Play a matching game or bingo game where you have cards with animal pictures, foods they eat, & natural habitat.
5. Read Charlotte's Web by E. B. White. Discuss with class the spider & survival in its habitat.
6. Class builds a bird feeder for winter & places it where they can watch bird

(cont.)

II. Outside Resource and Community Activities

- A. Visit a museum or zoo to see first hand animal life. Notice natural habitat.
- B. Collect & study a few special animals, such as mice, gerbals, etc. Keep in room.

Resource and Reference Materials
Publications:

Books:

Childcraft, Encyclopedia, World Book Co. (Vol. 4).

Familiar Animals of America by

Will Barker, Harper, 1956.

Science is Exploring, Book 3,

Marshall, Challand & Beauchamp, Scott, Foresman & Co.

Concepts in Science, Book 3

Harcourt, Brace & World.

The Last Free Bird by A. Harris Stone.

Let Them Live by Dorothy P. Lathrop.

Wildlife in Danger by Roy Pinney.

Children of the Ark: The Rescue of The World's Vanishing Wildlife by Robert Gray.

Audio-Visual:

Filmstrips:

Vanishing Prairie by Walt Disney.

The Living Desert by EBF.

Mammals of the Tropical Forests by EBF.

Marine Animals of the Northland by EBF.

Movies:

We Get Food from Plants & Animals by McGraw-Hill.

Common Animals of the Woods by EBF.

Community:

Continued and Additional Suggestive Activities
I. (cont.)

activities.

7. Record books made by children about live animals, animals on cards.

8. Discuss the term extinct and make a list of extinct animals. Excellent for articles about extinct animals.

9. Set up an aquarium & have children observe and record. Chain.

10. Make a bulletin board of animal life with children.

Sun → Grass → Cows → Milk

Sun → Plants → Butterflies

Sun → Plants → Cows → Children

Sun → Waterplants → Bugs

Sun → Grass → Rodents → Eggs

Materials	Continued and Additional Suggested Learning Experiences
<p>ia, World</p> <p>erica by</p> <p>1956.</p> <p>Book 3,</p> <p>Beauchamp,</p> <p>ook 3</p> <p>ld.</p> <p>A. Harris</p> <p>hy P. Lathrop.</p> <p>Roy Pinney.</p> <p>he Rescue of</p> <p><u>Wildlife</u> by</p> <p>alt Disney.</p> <p>BF.</p> <p><u>l Forests</u> by</p> <p><u>Northland</u> by</p> <p>s & Animals</p> <p><u>Woods</u> by EBF.</p>	<p>I. (cont.)</p> <p>activities.</p> <p>7. Record books made by class for one week. Report on live animals, animals on TV.</p> <p>8. Discuss the term extinct. Ranger Rick magazines are excellent for articles about such animals.</p> <p>9. Set up an aquarium & have children discover the food chain.</p> <p>10. Make a bulletin board of these food chains & discuss with children.</p> <p>Sun-→Grass-→Cows-→Milk-→Cheese-→Child</p> <p>Sun-→Plants-→Butterflies-→Chicken-→Fox</p> <p>Sun-→Plants-→Cows-→Children eating hamburger</p> <p>Sun-→Waterplants-→Bugs-→Ducks</p> <p>Sun-→Grass-→Rodents-→Eagle</p>

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BEHAVIORAL OBJECTIVES

Cognitive: Given a list of 5 animals, identify the food supply. List environmental factors necessary for survival. List 3 environmental factors that influence the carrying capacity of a specific environment as air, soil, bulldozers.

Affective: Through debate, the child defends his position: being conservation-minded or exterminator & consequences.

Skills to be Learned

Evaluate why some animals become extinct because of environmental factors or man-made factors

Contrast the role of the conservationist and the rampant hunter or fisherman.

SUGGESTED LEARNING ACTIVITIES

- I. Student-Centered in class activity
 1. Discuss cases in which an animal is considered a pest by some and not by others, as rats, mosquitoes, pigeon, Dutch elm bark beetle.
 2. Introduce by riddle the animals which are becoming extinct, such as carrier pigeon, heath hen, dodo, etc. Children will write individual reports.
 3. Have a panel discussion representing differing positions on the hunting & fishing positions. (Ex.-- Those who obey the rules and those who think the rules are unnecessary.)
 4. List the environmental factors essential for a pond, marsh, grassland, ocean, woodland, yard. Paint picture of each environment.
 5. Each child choose an animal, dramatize how you make home, get food, and means of survival.

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Problem Orientation Animals Live and Grow Grade 3

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Discuss cases in which an animal is considered a pest by some and not by others, as rats, mosquitoes, pigeon, Dutch elm bark beetle.
 2. Introduce by riddle the animals which are becoming extinct, such as carrier pigeon, heath hen, dodo, etc. Children will write individual reports.
 3. Have a panel discussion representing differing positions on the hunting & fishing positions. (Ex.- Those who obey the rules and those who think the rules are unnecessary.)
 4. List the environmental factors essential for a pond, marsh, grassland, ocean, woodland, yard. Paint picture of each environment.
 5. Each child choose an animal, dramatize how you make home, get food, and means of survival.

- II. Outside Resource and Community Activities
1. Have a conservationist and exterminator talk to the class, explaining their job and effectiveness.

Resource and Reference Materials	Continued and Additional
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p><u>The Last Free Bird</u> by A. Harris Stone.</p> <p><u>Let Them Live</u> by Dorothy Lathrop.</p> <p><u>Wildlife in Danger</u> by Roy Pinney.</p> <p><u>Wildlife in Danger</u> by Ivah Green.</p> <p><u>America's Endangered Wildlife</u> by George Laycock.</p> <p><u>Audio-Visual:</u></p> <p>6 study prints - <u>Wild Animals</u>, Group 1.</p> <p>6 study prints - <u>Wildlife Conservation</u> by Herbert Lowman.</p> <p><u>Films:</u></p> <p><u>Life in a Vacant Lot</u>, No. 4012, Green Bay Instructional Media Center (Encyclopedia Britannica.)</p> <p><u>The Desert Community</u>, No. 8030, Green Bay Instructional Media Center (Encyclopedia Britannica)</p> <p><u>Filmstrips:</u></p> <p><u>Adaptations in Animals</u>, General Science Film Series.</p> <p><u>How Animals Live</u>, Society for Visual Education, Inc., 1345 Diversey Parkway, Chicago, Ill. 60614.</p> <p><u>Community:</u></p> <p>Exterminator Conservationist</p>	

Materials	Continued and Additional Suggested Learning Experiences
<p>A. Harris</p> <p>hy Lathrop.</p> <p>Roy Pinney.</p> <p>Ivah Green.</p> <p><u>Wildlife</u> by</p> <p><u>animals,</u></p> <p><u>fe Con-</u></p> <p>owman.</p> <p>No. 4072,</p> <p>al Media</p> <p>Britannica.)</p> <p>No. 8030,</p> <p>al Media</p> <p>Britannica)</p> <p>, General</p> <p>ety for</p> <p>., 1345</p> <p>cago, Ill.</p>	

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BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Children should be able to identify the water cycle - trees & plants, run off to lakes, ponds, and ocean, and clouds, name 5 things that cause water pollution, and list 3 ways in which we can conserve water in our home.

Affective: Children will respond to an anonymous questionnaire regarding ways of conserving water in our homes and schools.

Skills to be Learned

List things that use water.
Develop a definition of water pollution.

Compare kinds of water, and list the things that contaminate it.

Chart the amount of daily rainfall for a given period.

I. Student-Centered in class activity

1. Conduct an experiment showing what happens when you wash a greasy or dirty cloth with water, with soap and water, and with detergent and water.
2. Collect pictures of things and various ways we use water in the home.
3. Make a bulletin board of the water cycle (clouds, land, lake, evaporation to clouds)
4. Compare samples of tap water, deep well water, pond, lake, and fresh rain water, for turbidity, living and non-living things.
5. Keep a chart of the amount of rainfall or snow in a 3-month period.

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Discipline Area Science

Subject Water

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Problem Orientation Water Supply Grade 3

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
en should y the s & plants, ponds, and name 5 water pol- ways in rve water en will ymous rding g water chools.	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none">1. Conduct an experiment showing what happens when you wash a greasy or dirty cloth with water, with soap and water, and with detergent and water.2. Collect pictures of things and various ways we use water in the home.3. Make a bulletin board of the water cycle(clouds, land, lake, evaporation to clouds)4. Compare samples of tap water, deep well water, pond, lake, and fresh rain water, for turbidity, living and non-living things.5. Keep a chart of the amount of rainfall or snow in a 3-month period.	<p>II. Outside Resource and Community Activities</p> <ol style="list-style-type: none">1. Visit water dept. and water treatment plant, & sewage plant.2. Have an engineer from a local industry, ex.-paper, tell how his company uses and replaces the water into the stream or river.
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Resource and Reference Materials

Continued and Additional Sug

Publications:

Books:

A World in a Drop of Water,
Silverstein, Alvin & Virginia.
Let's Go to Stop Water Pollution,
Michael Chester.
Rain Drop Splash, Tresselt.

Poem:

The Brook by Alfred Lord
Tennyson.

Audio-Visual:

Visit to the Waterworks,
BAVI film 3823.
Your Friend the Water - Clean
and Dirty, BAVI film 3174
Conservation - Enough Water for
Everyone,
Water, Water Everywhere, BAVI
Ecology Kit, Can I Drink the
Water? by Urban Systems, Inc.
Cambridge, Mass.

Community:

Water department
Water treatment plant
Sewage plant
Resource personnel from industry

e Materials

Continued and Additional Suggested Learning Experiences

Water,
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ESEA Title III - 59-70-0135-1 Project I-C-E

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 E depend on oxygen, through respiration,
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 T to release the energy in their food.

Discipline Area Science

Subject Air

Problem Orientation Clean Air

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p>Cognitive: Make a list of 5 things that need air. Draw a picture showing 5 things in the community that pollute the air.</p> <p>(Affective Objective below)</p>	<p>I. Student-Centered in class activity</p> <p>A. Class activity</p> <ol style="list-style-type: none"> 1. Give balloons to the students. Breathe normally & blow up the balloon with the same amount of air that they take in with each breath. Note the size differences among the balloons. Calculate the number of breaths taken each minute, each hour, and each day. Figure out how many balloonfuls of air each student breathes in a day. Calculate the class average. Calculate also the amount of air needed if students exercised for an hour.
<p><u>Skills to be Learned</u></p> <p>Chart making Discussion Observation Community survey Collection of air samples</p> <p>-----</p> <p><u>Affective:</u> Students may volunteer opinions on their likes or dislikes of the following: smokestack, air filter, air conditioner, car exhaust, burning brush pile, trees.</p>	<ol style="list-style-type: none"> 2. Introduce BOD-Bio-oxygen-demand. Then have 2 goldfish in separate bowls. Supply one with plants and fresh water daily, the other leave alone. Children will chart any change in behavior of the 2 fish.

Supply of clean air is

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energy in their food. Problem Orientation Clean Air Grade 3

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
List of air. ing 5 nity r. (see below)	<p>I. Student-Centered in class activity</p> <p>A. Class activity</p> <p>1. Give balloons to the students. Breathe normally & blow up the balloon with the same amount of air that they take in with each breath. Note the size differences among the balloons. Calculate the number of breaths taken each minute, each hour, and each day. Figure out how many balloonfuls of air each student breathes in a day. Calculate the class average. Calculate also the amount of air needed if students exercised for an hour.</p> <p>2. Introduce BOD-Bio-oxygen-demand. Then have 2 goldfish in separate bowls. Supply one with plants and fresh water daily, the other leave alone. Children will chart any change in behavior of the 2 fish.</p>	<p>II. Outside Resource and Community Activities</p> <p>A. Outside Activity</p> <p>1. Fasten a sheet of white paper inside a shallow pan or spread a piece of glass with a thin coating of petroleum. Place outside in different areas. Or place white paper tissues outside in different places. Examine the surfaces at intervals with a magnifying lens or microscope.</p> <p>2. Make a community survey of some of the major sources of air pollution. Is trash burned at the dump? Do people burn leaves in the fall? Do industries & power plants emit smoke & gases? How can you tell that the air is polluted? Can pollution be eliminated completely?</p>
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Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p> <u>Air</u> by Irving & Ruth Adler <u>A World in a Drop of Water</u> by Alvin & Virginia Silverstein <u>Earthworms</u> by Dorothy Childs Hagner <u>Clean Air-Sparkling Water: The</u> <u>Fight Against Pollution</u> by Dorothy Shuttlesworth <u>Let's Go to Stop Air Pollution</u> by Michael Chester <u>Clean Streets, Clean Water,</u> <u>Clean Air</u> by Cynthia Chapin Life reprint - Air Pollution </p> <p><u>Audio-Visual:</u></p> <p><u>Films:</u></p> <p> <u>The First Mile Up</u>, McGraw-Hill, 20 min. </p> <p><u>Filmstrip:</u></p> <p> <u>The Ocean of Air We Live In</u>, Popular Science Pub. Co. </p> <p><u>Community:</u></p>	<p>II. (cont.)</p> <p> What would the community b pollution be reduced? How? </p>

e Materials	Continued and Additional Suggested Learning Experiences
<p>Adler Water by verstein Childs</p> <p>Water: The ion by h Pollution</p> <p>Water, Chapin lution</p> <p>Graw-Hill,</p> <p>ive In, Co.</p>	<p>II. (cont.)</p> <p>What would the community be like if it were? Can pollution be reduced? How?</p>

C 6. Natural resources are not equally

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BEHAVIORAL OBJECTIVES	SUGGESTED LEA
<p><u>Cognitive:</u> Student can read an electric meter, name more than one source of electric power & state whether the source of power is re-usable or not.</p> <p><u>Affective:</u> Each child will make an individual inventory of his family showing ways they could conserve electricity.</p>	<p>I. Student-Centered in class activity</p> <p>1. Each child will count the number of times he uses electricity in one day, ex lights, electric toothbrush, can opener, etc.</p> <p>2. List the electrical appliances used 25 years ago. List the electrical appliances used today. Draw the conclusion that there are more people who demand or need more electricity than 25 years ago.</p> <p>3. Discuss paying house electric bill & how electric current is used. Bring electric bill from home. Pretend that a family electricity bill has doubled. List all the reasons why the increase. Dramatize a family discussion of the sudden increase.</p> <p>4. Find articles on large city blackouts & brownouts & discuss need for using electric power wisely. Why does a brownout occur? Have the children trace electrical energy back to its</p>
<p><u>Skills to be Learned</u></p> <p>Observing</p> <p>Experimenting with electric current</p> <p>Draw inferences from charts made & information gathered as to how to use this energy wisely.</p>	<p>(Cont.)</p>

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ACTIVITIES	SUGGESTED LEARNING EXPERIENCES	
can er, ource state of power ld will nventory ng ways elect-	<p>I. Student-Centered in class activity</p> <p>1. Each child will count the number of times he uses electricity in one day, ex. lights, electric toothbrush, can opener, etc.</p> <p>2. List the electrical appliances used 25 years ago. List the electrical appliances used today. Draw the conclusion that there are more people who demand or need more electricity than 25 years ago.</p> <p>3. Discuss paying house electric bill & how electric current is used. Bring electric bill from home. Pretend that a family electricity bill has doubled. List all the reasons why the increase. Dramatize a family discussion of the sudden increase.</p> <p>4. Find articles on large city blackouts & brownouts & discuss need for using electric power wisely. Why does a brownout occur? Have the children trace electrical energy back to its</p> <p>(Cont.)</p>	<p>II. Outside Resource and Community Activities</p> <p>1. Visit a nearby dam that produces electricity, or write the Ford Co. St. Paul, Minn. to find out about their dam-powered turbines.</p> <p>2. Visit the Wisconsin Public Service Plant in your area, or have a WPS representative speak to the class.</p>
d electric om charts gathered is energy		

Resource and Reference Materials
Publications:

Science is Exploring, Scott, Foreman, pp. 46-62, 1965.

Easy Science Experiments, Kleinman, Holt Pub. Co., 1959, pp. 89-96.

Audio-Visual:

Filmstrip - Electricity, E.B.F.
How We Hear, filmstrip & record,
by Beltone Hearing Service.

Films:

Electric Circuits by McGraw-Hill
13 min.

Electricity for Beginners by
Coronet, 11 min.

Electricity and How It Is Made by
E.B.F., 16 min.

Electricity: How to Make A Circuit
by E.B.F., 11 min.

Community:

Wisconsin Public Service (films,
brochures, representative)

Continued and Additional Suggest

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does coal get its energy?
your locality is water sto
this energy come from? Dra
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5. Draw clock faces & demon
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6. Class list sources of el
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Sources of power: dry cell
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8. Do experiment. from vari
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9. Class construct bulletin
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Materials	Continued and Additional Suggested Learning Experiences
<p>ott, Fores-</p> <p>, Kleinman, . 89-96.</p> <p>E.B.F. record, ice.</p> <p>Graw-Hill</p> <p>rs by</p> <p>Is Made by</p> <p>e A Circuit</p>	<p>I. (Cont.)</p> <p>original source. Suppose coal is used as a source of energy for generating power in your community. Where does coal get its energy? If the source of energy for your locality is water stored behind a dam, where did this energy come from? Dramatize by class-written skits the convenience of electrical power in the home and the inconvenience caused by a blackout.</p> <p>5. Draw clock faces & demonstrate how to read an electric meter.</p> <p>6. Class list sources of electric power (in case of power plants, transformers, give known community locations). Sources of power: dry cell, storage battery, wet cell, generators powered by gasoline, steam, running water.</p> <p>7. Relist these sources as stored and consumable.</p> <p>8. Do experiments from various texts with dry cells, wiring lights, bell, construct electric magnets.</p> <p>9.*Class construct bulletin board or large chart of magazine pictures of uses of electricity.</p>

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Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: Children should be able to name 4 natural resources in their neighborhood, school or home. Identify on a map the Fox River, and name 4 different pollutants of a river. List 5 ways in which he could help to conserve natural resources.

Affective: The teacher will draw 2 diagrams of farms. One farm has a pasture and an over-supply of water for his cattle. The other farmer has pasture but no water. How would you solve the farmer's problem? (or) One farmer has an over-abundance of pasture but not enough water, neighboring farmer has an over-abundance of water but not enough pasture. How would solve the problem?

Skills to be Learned

Measuring a plot of ground
Examine and observe water, forest, pond.

Collection of samples of natural resources

SUGGESTED LEARNING

I. Student-Centered in class activity

1. Identify natural resources in your area - water, land, rocks, wildlife, fossils, plants.

2. Pass out 5 animal crackers to each student. Then empty box. Box represents earth & crackers are the iron ore supply. People have the iron ore supply (crackers). What will happen when the iron ore supply is gone? Where will the iron to make cars come from?

3. Show map of Fox River. If possible, talk to a farmer whose land adjoins the river. Let class predict 2 possible outcomes if all the farmers having land along the river pumped out the river to irrigate the crops.

4. Talk about the recreational uses and possibilities on the Fox River.

5. Each child should rub 2 pieces of sandstone to make small particles.

(Cont.)

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OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. Identify natural resources in your area - water, land, rocks, wildlife, fossils, plants.
 2. Pass out 5 animal crackers to each student. Then empty box. Box represents earth & crackers are the iron ore supply. People have the iron ore supply (crackers). What will happen when the iron ore supply is gone? Where will the iron to make cars come from?
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 4. Talk about the recreational uses and possibilities on the Fox River.
 5. Each child should rub 2 pieces of sandstone to make small particles.

(Cont.)

- II. Outside Resource and Community Activities
 1. Take water samples. Let water settle & examine sediment with hand lens & microscope. Children should then list 4 things that pollute, and 4 ways that pollution of a body of surface water occurs.
 2. Go to school forest. Search for acorns & small oak trees. Look for squirrels (for hunting or fun to watch). Examine forest floor.
 3. Go to conservation area. Watch for pheasants, crickets, other insects. At a pond, note swallows which eat mosquitoes. Also note that fish eat water insects, which provide food & recreation.
 4. Measure 4 plots 3' square in different places, where plant life will vary greatly. Get soil samples of plot. Find species of plants in each. Note that soil will vary statewide, nationwide, & worldwide.

Resource and Reference Materials
Publications:

Books:

America's Treasure by W. Maxwell
Reed.
Great Heritage by Katherine Shippen.
Rivers and Watersheds in America's
Future by Elizabeth Helfmen.
Wilderness Bill of Rights by
William Douglas.
Where the Brook Begins by Margaret
Farrington Bartlett.
Living Things by Jeanne Bendrick.
Clean Streets, Clean Water, Clean
Air by Cynthia Chopin.
The Last Free Bird by A. Harris
Stone.
Alligator Hole by Julian May.
Action at Paradise Marsh by Ester
Wier.

Audio-Visual:

Filmstrips:

Rocks and Minerals
How Soil is Formed
The Story of Soil
Animals of the Forest by McGraw-Hill
Conserving our Soil and Water by
Popular Science Pub. Co.
The Living Desert by EB Filmstrips.
The Ocean of Air We Live In by
Popular Science Pub. Co.
Our National Forest by U.S.
Forest Service, Department of Agri-
culture, South Building, Washington,
D.C. 20250.

Picture kit:

Conservation by American Petroleum Inst.
1271 Ave. of Americas New York, N.Y.
10020

(Cont.)

Continued and Additional Suggeste

Resource Materials (Cont.)

Films:

Conserving Our Mineral Resour
Our Endangered Wildlife, McGr
Conservation for the First Ti
The Problem With Water Is, Mc
The Food Population, McGraw-H
Beaver Dam, McGraw-Hill, 15 m

I. (Cont.)

Gather leaves, dead grass, ba
this with sand, and match thi
ground. Estimate how many yea
particles to disintegrate.

Have children decide why so
to future generations - will
shelter.

Materials	Continued and Additional Suggested Learning Experiences
J. Maxwell	Resource Materials (Cont.)
Marine Shipper.	Films:
in America's	<u>Conserving Our Mineral Resources Today</u> , Coronet
offmen.	<u>Our Endangered Wildlife</u> , McGraw-Hill
ts by	<u>Conservation for the First Time</u> , McGraw-Hill
	<u>The Problem With Water Is</u> , McGraw-Hill
	<u>The Food Population</u> , McGraw-Hill
	<u>Beaver Dam</u> , McGraw-Hill, 15 min.
by Margaret	
e Bendrick.	I. (Cont.)
ter, Clean	Gather leaves, dead grass, bark from dead limbs. Mix this with sand, and match this with soil on playground. Estimate how many years it would take for large particles to disintegrate.
a. Harris	Have children decide why soil is important to us and to future generations - will produce food, clothing, shelter.
an May.	
h by Ester	
by McGraw-Hill	
l Water by	
Co.	
8 Filmstrips.	
ve In by	
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ment of Agri-	
ng, Washington,	
ean Petroleum Inst.	
s New York, N.Y.	
ont.)	

C 7. Factors such as facilitating transportation,
 C economic conditions, population growth, Discipline Area Sci
 N and increased leisure time have a great Subject Sci
 E influence on changes in land use and Problem Orientation P
 P centers of population density.

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
<p><u>Cognitive:</u> The child will identify on a U.S. map where population density exists, ex. coastline, along rivers, lakes. Define leisure time and list five ways in which they use their leisure time.</p> <p><u>Affective:</u> The children organize a hobby show and shares their activities with others</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> Note on map where crowded congested cities are (blue). Now color equal area in red (showing how much land area will be needed when population in U.S. is doubled). Will be less area to produce food for people. Discuss leisure time. Ask the children how their parents use 24 hour day. Ex., father sleeps 8 hours, works 8 hours, travels 1 hour to and from work eats 1 1/2 hour, bathes and showers 1/2 hour, 5 hours of leisure time (used constructively and derive personal satisfaction). List the different kinds of hobbies among children and adults. Discuss how the importance of an adult having a hobby to fill the approximately 40 hours of free or leisure time each week. Have a hobby show for children and adults. (If they wish). 	<p>II. C 1 2 3</p>
<p><u>Skills to be Learned</u></p> <p>Gathering statistics from newspapers</p> <p>Interviewing hospital personnel</p> <p>Chart making</p> <p>Making a bar graph</p> <p>Map reading</p> <p>Hobby show</p>		

h as facilitating transportation,

tions, population growth, Discipline Area Science

leisure time have a great Subject Science

changes in land use and Problem Orientation Population Grade 3
ulation density.

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
ild will S. map when y exists, ong define list h they e time. children show activi-	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none">1. Note on map where crowded congested cities are (blue). Now color equal area in red (showing how much land area will be needed when population in U.S. is doubled). Will be less area to produce food for people.2. Discuss leisure time. Ask the children how their parents use a 24 hour day. Ex., father sleeps 8 hours, works 8 hours, travels 1 hour to and from work, eats 1 1/2 hour, bathes and showers 1/2 hour, 5 hours of leisure time (used constructively and derive personal satisfaction).3. List the different kinds of hobbies among children and adults. Discuss how the importance of an adult having a hobby to fill the approximately 40 hours of free or leisure time each week. Have a hobby show for children and adults. (If they wish).	<p>II. Outside Resource and Community Activities</p> <ol style="list-style-type: none">1. Find out how many people live in your community. How many doctors, lawyers, teachers, builders, mechanics and other kinds of workers serve the community. Determine ratio. If there is a shortage in your community, what are some of the reasons for it? Also question their parents as to how many there were 50 years ago. Make a bar graph to show increase.2. Find out from the local hospital or local newspaper how many babies are born in a week. At that rate, what would the population of your town be in one year? 10 years? 20 years? What other factors must be considered in predicting? Ex. death. Among members of the class, what is the average size family? Compare with national average size of 4.3.3. Children can devise (cont.)

Resource and Reference Materials	Continued and Additional Suggestions
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p><u>Little Boy Brown</u> by Harris</p> <p><u>The Big Island</u> by May</p> <p><u>Nobody's Cat</u> by Miles</p> <p><u>Farewell to Shady Glen</u> by William Peet</p> <p><u>The Wump World</u> by William Peet</p> <p><u>The Big Pile of Dirt</u> by Eleanore Clymer</p> <p><u>Audio-Visual:</u></p> <p><u>Films:</u></p> <p><u>Cities of the Future</u> by McGraw-Hill, 25 minutes</p> <p><u>People by the Billions</u> by McGraw-Hill, 28 minutes</p> <p><u>Population Explosion</u> by McGraw-Hill, 15 minutes</p> <p><u>Tomorrow's World-Feeding the Billions</u> by McGraw Hill</p> <p><u>The City</u> by EBF</p> <p><u>The House of Man</u> by EBEC</p> <p><u>Community:</u></p> <p><u>Local Newspapers</u></p>	<p>II.</p> <p>3. ways to visualize large them to things that are m Go outside with the class area. Group the class together estimate the area which would 100 students. Estimate of 2,000 or 10,000. Try to visualize a rock fest, 200,000,000 on earth.</p>

Continued and Additional Suggested Learning Experiences II.

3. ways to visualize large numbers by comparing them to things that are more familiar. Ex. Go outside with the class to a large cleared area. Group the class tightly together and estimate the area which would be covered by 100 students. Estimate for 1,000 students, 2,000 or 10,000. Try to visualize 40,000 at a rock fest, 200,000,000 in U.S., 3,000,000,000 on earth.

C 8. Cultural, economic, social, and
 O
 N political factors determine status
 C
 E of man's values and attitudes
 P
 T toward his environment.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> Write a list of 10 describing words for sound, bark, peep, honk, etc.</p> <p><u>Affective:</u> Statement: "All sounds are bad." Defend or reject.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Experiments in sound ranges <ol style="list-style-type: none"> a. electrical appliances & machines b. musical instruments c. clocks d. nature's sounds 2. Experiments in how sound travels: <ol style="list-style-type: none"> a. tuning fork b. rubber bands on a box c. drum d. pebble thrown in water e. home-made phone f. string & a glass g. doorbell 3. Discuss how men & animals use sound. List similarities <ol style="list-style-type: none"> a. sound received by vibrations thru a membrane b. sound is a protective warning c. we often have too much sound
<p><u>Skills to be Learned</u></p> <p>Observation Research Experiment Compare</p>	

social, and

rmine status

Discipline Area

Science

itudes

Subject

Sound

Problem Orientation

Grade 3

ES

SUGGESTED LEARNING EXPERIENCES

or

I. Student-Centered in class activity

1. Experiments in sound ranges:

- a. electrical appliances & machines
- b. musical instruments
- c. clocks
- d. nature's sounds

2. Experiments in how sound travels:

- a. tuning fork
- b. rubber bands on a box
- c. drum
- d. pebble thrown in water
- e. home-made phone
- f. string & a glass
- g. doorbell

3. Discuss how men & animals use sound. List similarities

- a. sound received by vibrations thru a membrane
- b. sound is a protective warning
- c. we often have too much sound

II. Outside Resource and Community Activities

1. With a tape recorder, children can record & analyze the sounds in the community. List the sounds according to categories: natural, animal-made, or man-made, loud or soft, necessary or unnecessary, & so on. How do the sounds affect animals and humans? Can anything be done to reduce sounds that are disturbing? Have the children each list sounds they consider to be noises. Do their lists match? What is the advantage of using the tape recorder? Do we hear all the different sounds around us?

2. Tape the sound of an auto, twin-engine plane, and jet plane. Then talk about the physical effects of each on the environment, effects on man, animals, plants.

Resource and Reference Materials

Continued and Additional Sugges

Publications:

Jr. Science Book of Sound by
Anderson, Garrard Press, 1962.
Sound by Neal, Follett, 1962.
The Magic of Sound by Kettelkamp,
William Morrow & Co., Pub., 1956
Sounds Are All Around, Pine & Levine,
Whittlesey House, 1958.

Audio-Visual:

Films:

Sound by Films, Inc., 10 min.
Sound and How It Travels by EBF,
11 min.
Sound for Beginners by Coronet,
11 min.

Community:

Materials	Continued and Additional Suggested Learning Experiences
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by
1962.
962.
telkamp,
b., 1956
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by EBF,
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C 10. Short-term economic gains may

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N produce long-term environmental

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Discipline Area Science

Subject Science

Problem Orientation Soil

Conservation

BEHAVIORAL OBJECTIVES

Cognitive: Student can tell why there is a need for soil conservation. On a field trip he can identify good & poor soil practices.
Affective: "A hillside is eroding", Let each child choose his way of controlling the erosion.

Skills to be Learned

Experimenting
Classifying
Observing
Making inferences

SUGGESTED LEARNING EXPER

I. Student-Centered in class activity

II.

A. Classroom activity

1. Drip water over 2 soil samples, one planted, but not the second. Observe erosion.
2. Make soil with crushed rock, dead insects, leaves, peelings. Plant seeds.
3. List all things in the kitchen that come directly or indirectly from soil.
4. Take 2 soil samples, one topsoil & one subsoil. Grow a plant in each & compare their growth.
5. For bulletin board, cut out magazine pictures of wildlife that depend on soil conservation. This would include a lot. It could turn into a paper collage - individual posters - or class may decide to classify into groups.
6. Research for an able student - define a watershed & draw a picture.
7. List ways soil erodes; wind.

economic gains may

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Discipline Area Science

Subject Science

Soil

Problem Orientation Conservation Grade 3

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom activity

1. Drip water over 2 soil samples, one planted, but not the second. Observe erosion.
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6. Research for an able student - define a watershed & draw a picture.
7. List ways soil erodes; wind.

II. Outside Resource and Community Activities

A. Field trips

1. Collect soil samples & label as to course, fine, sand, clay, loam, peat, by color, smell.
2. Collect soil samples from different depths: 5", 12", 20" & observe any differences.
3. Collect 2 bottles of stream water, one before a storm & one after. Allow to settle and compare.
4. Observe the soil around a newly dug basement or construction. Look for signs of erosion, esp. by sewer or curb. Look for soil other places, sidewalk cracks, under fences, on the blacktop. How did it get there?
5. Take pictures along a highway where newly constructed or where the road cuts (cont.)

Resource and Reference Materials
Publications:

Books:

The Big Pile of Dirt, Eleanor
Clymer

A Small Lot, Keith

Farewell to Shady Glade, Wm. Peet

The Wump World, Wm. Peet

Science is Exploring, Scott-

Foresman, Gr. 3, 1965, p. 102-104

A Place to Live, National Audubon
Society, 1970

The Dirt Book, Eva Knox Evans

Audio-Visual:

Films:

Adventures of Junior Raindrop, U.S.

Dept. of Agriculture, 10 min.

Conserving Our Soil Today, Coronet,
11 min.

Man Uses & Changes the Land,

Coronet, 11 min.

Your Friend the Water - Clean or
Dirty, EBF, 6 min.

Record - "The Conservation Song" by
Science Singing Record Sampler

Community:

Soil & Water Conservation

District, local offices in the
Federal Building of your
county seat

Continued and Additional Suggested

II. (cont.)

through a hill. Discuss eros
methods of control.

6. Take pictures of farmland s
& strip cropping. Discuss th

7. Plant a tree for Arbor Day
erosion can be prevented.

8. Poke a stick into different
compact (which allows little
& loose soils (allows more w
is growing on each.

9. Observe how quickly water s
covered soil & bare soil.

Materials	Continued and Additional Suggested Learning Experiences
<p>or</p> <p>Peet</p> <p>102-104</p> <p>adubon</p> <p>ns</p> <p>pp, U.S.</p> <p>n.</p> <p>Coronet,</p> <p>n or</p> <p>ng" by</p> <p>er</p> <p>e</p>	<p>II. (cont.)</p> <p>through a hill. Discuss erosion possibilities & methods of control.</p> <p>6. Take pictures of farmland showing contour plowing & strip cropping. Discuss their merits.</p> <p>7. Plant a tree for Arbor Day in a place where erosion can be prevented.</p> <p>8. Poke a stick into different soils. Observe if compact (which allows little water to soak in) & loose soils (allows more water) & observe what is growing on each.</p> <p>9. Observe how quickly water soaks into plant covered soil & bare soil.</p>

C 11. Individual acts, duplicatedO or compounded, produce significantC environmental alterations over time.P
TDiscipline Area ScienceSubject Science

Individu

Problem Orientation Acts

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPER

Cognitive: The children will draw pictures of four things people do which change his environment. Ex. littering, start fires, drive cars unnecessarily, destroy wildlife without cause.

Affective: After the learning experiences, the child will plan an imaginary trip to a public park and criticize the rules and defend their behavior.

Skills to be Learned

Survey of parents
Collecting pictures
Discussion
Observation walk

I. Student-Centered in class activity

1. Discuss the rights of people to clean beaches vs. the rights of cities to dispose of their wastes at the closest possible places.

2. List ways people set fires: cigarettes, matches, camp fires, arson, trash piles, burning leaves, etc. Discuss.

3. Discuss times when they have gone places with their parents and have gotten caught in traffic jams. If a bus holds 40 people, how many cars could have been replaced by one bus?

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Discipline Area Science

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Individual

Problem Orientation Acts

Grade 3

IVES

SUGGESTED LEARNING EXPERIENCES

- n will
- I. Student-Centered in class activity
1. Discuss the rights of people to clean beaches vs. the rights of cities to dispose of their wastes at the closest possible places.
2. List ways people set fires: cigarettes, matches, camp fires, arson, trash piles, burning leaves, etc. Discuss.
3. Discuss times when they have gone places with their parents and have gotten caught in traffic jams. If a bus holds 40 people, how many cars could have been replaced by one bus?
- . Ex.
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- II. Outside Resource and Community Activities
1. Take a survey of all the fathers, mothers or relatives who hunt, ex. ducks or deer. Discuss the "sport" of such an act. Then read The Happy Hunter by Duvoisin and try to instill the idea of watching and not shooting animals. Play With Me by Ets also helps the child understand that some wild creatures come near when we are quiet.
2. Collect pictures of lakes. Write captions as to how area is used, ex. amusement parks, cottage sites, areas preserved as park.
3. Class walk to a busy street and see if they can notice the smell of car exhaust.

Resource and Reference Materials

Publications:

Books:

The Happy Hunter by Duvoisin

Rrra-ah by Keith

The Wump World by Peet

Farewell to Shady Glen by Peet

The Last Tree Bird by Stone

Trail of Apple Blossoms by

Irene Hunt

Action at Paradise Marsh by

Ester Wier

Ash Road by Ivan Southall

Audio-Visual:

Film:

Conservation for Beginners

Coronet Films, 11 minutes

The Litterbug

by Walt Disney, 8 minutes

The Litterbug

by Avis, 10 minutes

Filmstrips:

Ecological Imbalances: Six

Systems Dispailed

by Eye Gate House, Inc.

Community:

Continued and Additional Suggeste

Materials

Continued and Additional Suggested Learning Experiences

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C 12. Private ownership must be

O
N regarded as a stewardship and

C
E should not encroach upon or violate

P
T the individual right of others.

Discipline Area Science

Subject Science

Problem Orientation Land

BEHAVIORAL OBJECTIVES

Cognitive: The child will identify (from pictures) some of the violations which are imposing on others rights. List 5 rules or practices that each can do as individuals to get along well with our neighbors.
Affective: The student will support the idea that neighbors should try to get along with each other.

Skills to be Learned

Alphabetize word list
Discussion
Evaluation
Definitions

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Children list why they like their homes. Then each list how they would like to change their home. Discuss whether these changes are going to violate any of the rights of their neighbors or the community. Ex. - Parking cars, putting up fences, allowing animals to be unattended, unkept yards.
2. Discuss rules that should be made to keep parks natural. Include rules that pertain to trails, plants, animals, souvenirs, camping places, dumping unwanted articles on banks of the streams or in parks. Write limericks or create posters to help stop littering.
3. Prepare a word bank of words relating to environment. Ex. - Aroma, debris, contamination, natural resources, wildlife, pungent, radioactivity, decay, (cont.)

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Discipline Area Science
Subject Science
Problem Orientation Land Use Grade 3

ACTIVES	SUGGESTED LEARNING EXPERIENCES	
d will ares) ons which ers s or can do et along oors. ent ea that y to other.	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none">1. Children list why they like their homes. Then each list how they would like to change their home. Discuss whether these changes are going to violate any of the rights of their neighbors or the community. Ex. - Parking cars, putting up fences, allowing animals to be unattended, unkept yards.2. Discuss rules that should be made to keep parks natural. Include rules that pertain to trails, plants, animals, souvenirs, camping places, dumping unwanted articles on banks of the streams or in parks. Write limericks or create posters to help stop littering.3. Prepare a word bank of words relating to environment. Ex. - Aroma, debris, contamination, natural resources, wildlife, pungent, radioactivity, decay, (cont.)	<p>II. Outside Resource and Community Activities</p> <p>A. Outside classroom</p> <ol style="list-style-type: none">1. In winter, get a copy of snowmobile ordinances (state & local). Have a conservationist talk to the group, & tell about the hazards, violations, & consequences of constant use of these machines in forests, on ponds, lakes & public parks.

Resource and Reference Materials
Publications:

Books:

Just Right by Moore
A Small Lot by Keith
Follow the Brook by Lathrop
Who Goes There? by Lathrop
End of the Line by Udry
My Side of the Mountain by Jean
George

Audio-Visual:

Films:

Your Friend the Forest - Save It
or Destroy It by EBF
Your Friend the Soil - Keep It
or Lose It by EBF
Your Friend the Water - Clean or
Dirty by EBF

The Treehouse, CESA Office UWGB

Filmstrip:

Environmental Pollution...Our
World in Crisis by Ward's
Natural Science Establishment, Inc.

Community:

Continued and Additional Suggest

I. (cont.)

detergent, conservation,
unreplenishable, consumpt
sewage, thermal, bacteria
perishable, etc.

4. Let children find how ma
car, on the train of 5 ca
less harmful to our enviro
5. Show pictures of haze ov
belching smoke. Discuss t
found to eliminate so muc
to catch the soot in-the

Materials

Continued and Additional Suggested Learning Experiences

I. (cont.)

detergent, conservation, poisonous, mucky, stench, unreplaceable, consumption, refuse, disease, sewage, thermal, bacteria, pesticides, recreation, perishable, etc.

4. Let children find how many people can ride in one car, on the train of 5 cars, one bus. Which is less harmful to our environment?
5. Show pictures of haze over cities & of chimneys belching smoke. Discuss the fact that ways can be found to eliminate so much smoke by using devices to catch the soot in the smoke.

Save It

Keep It

Clean or

Use UWGB

.Our

s
hment, Inc.

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish to format. Please feel free to adapt it and add more pages. Let us know and comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

When an episode is used in your class, you may wish to duplicate this suggested form to adapt it and add more pages. Let us know all your critiques, both negative and positive.

ives

g Experiences

Community Activities:

& Reference Materials
(Questions & comments)

ED055918

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 4

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338

Robert Warpinski
Robert Kellner,
George Howlett,

E INSTRUCTION - CURRICULUM - ENVIRONMENT

PROGRAM FOR ENVIRONMENTAL EDUCATION

Science GRADE 4

Title III E.S.E.A.

in CESA's 3-8-9

onsin 54301

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is ready over a hundred teachers, year long meetings, a summer workshop, and ecologists, this guide means realistic, developed aid for you. Please which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are designed--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your students to adapt, adopt, or use. By design, the range of suggestions is wide and usage are even wider. Many episodes are self-contained others can be changed in part or developed more keenly over a few possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning experience. The reasons are simple. No guide has all the answers and no unless viewed in the context of your classroom situation. Thus, be give it a triple reading, check over the resources listed, make me prime your students, and seek help. The Project personnel and teaching knowledge page stand ready to aid your efforts. Feel free to ask.
4. The Project Resource Materials Center serves all CESA 3, 8, and 9 private. We will send available materials pre-paid. Call for any help visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library for Center materials. Please offer suggestions, comments, or advice--a service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch ideas suggestions on the episode pages or use the attached evaluation form collected in late May next year and will be used in our revisions. We reactions and suggestions--negative and positive. Please note that in the episodes may refer to specific, local community resources or cases, individual school districts and teachers will have to adopt substitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--survival--Creation's beauty and complexity--often noted as the work of a generation and human energy to save. A year's work by a hundred of your fellow gesture. Without you, their work will crumble, and so might we all let us live to think, feel, and act in harmony with our world.

Editorial

1. Cognitive means a measurable mental skill, ability, or process
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels a cognitive)
4. EPA - Environmental Problem Area

PREFACE

ite students about their environment, help is ready. Thanks to the efforts
achers, year long meetings, a summer workshop, university consultants and
de means realistic, developed aid for you. Please note the following ideas
teachers in writing and editing this guide.
plementary in nature and the episodes are designed--at appropriate instan-
existing, logical course content.
ode offers suggestions. Since you know your students best, you decide what
or use. By design, the range of suggestions is wide; your chances for experi-
ge are even wider. Many episodes are self-contained, others open-ended, still
nged in part or developed more keenly over a few weeks. These built-in
ow you to explore.
you try the episodes and suggested learning experiences but please pre-
are simple. No guide has all the answers and no curriculum will work
the context of your classroom situation. Thus, before trying an episode,
reading, check over the resources listed, make mental and actual notes,
ts, and seek help. The Project personnel and teachers listed on the ack-
stand ready to aid your efforts. Feel free to ask their help in pre-planning.
rce Materials Center serves all CESA 3, 8, and 9 area schools--public and
send available materials pre-paid. Call for any help, materials, or to
4338.

project ICE Bibliography in your school library for available Resource
Please offer suggestions, comments, or advice--at any time--so that this
Let's help each other.
with the guide by reacting to it with scratch ideas, notes, and extended
e episode pages or use the attached evaluation format, which will be col-
y next year and will be used in our revisions. We sincerely want your
gestions--negative and positive. Please note that some resources listed
ay refer to specific, local community resources or conditions. In such
school districts and teachers will have to adopt local or available sub-
of terms pertinent to the episodes is below.
ner experts have simplified the issue--survival--yours, mine, our students,
and complexity--often noted as the work of a genius--will take our genius
to save. A year's work by a hundred of your fellow teachers is a saving
you, their work will crumble, and so might we all--literally. Instead,
nk, feel, and act in harmony with our world.

Editorial Board

a measurable mental skill, ability, or process based on factual data.
s to student attitudes, values, and feelings.
ptable Performance Will Include (labels a cognitive or mental performance.)
ntal Problem Area

ACKNOWLEDGEMENTS: The following teachers and consultants participated in the Supplementary Environmental Education

CESA #3

Eugene Anderson, Peshtigo
Laura Berken, Oconto Falls
Willard Collins, Crivitz
John Cowling, Niagara
Nicholas Dal Santo, Pembine
Robert Dickinson, Oconto
Ann Fuhrmann, Marinette
Lillian Goddard, Coleman
William Harper, Lena
Robert Herz, St. James (L)
Ester Kaatz, Wausaukee
Michael Kersten, Suring
Douglas Koch, Cath. Central
Donald Marsh, Bonduel
David Miskulin, Goodman
Don Olsen, Shawano
Anna May Peters, Florence
Elmer Schabo, Niagara
Marion Wagner, Gillett
Ruth Ward, Crivitz
George Kreiling, Marinette
Marg. McCambridge, White Lake
Virginia Pomusl, White Lake
Gailen Braun, Lena
Kay De Puydt, Gillett
Lousene Benter, Gillett

CESA #8

Lowell Baltz, Weyauwega
William Behring, Lourdes
David Bell, Neenah
Marie Below, Clintonville
William Bohne, Kimberly
Bob Church, Little Chute
Ronald Conradt, Shiocton
Lee Hallberg, Appleton
Ronald Hammond, Hortonville
Jerome Hennes, Little Chute
Barbara Huth, Menasha
Darrell Johnson, Hortonville
Bernadyne King, Neenah
Harold Lindhorst, St. Martin(L)
John Little, Winneconne
Gene Ploetz, Kaukauna
Gordon Rohloff, Oshkosh
William Schaff, St. Joseph
Doris Stehr, Mt. Calvary (L)
Carolyn Shills, New London
Sister Dorothy, Xavier
Clarence Trentlage, Freedom
Mike Hawkins, Xavier
Beth Hawkins, Xavier
Ed Patschke, Menasha
Connie Peterson, St. Martin(L)
Dallas Werner, Kaukauna
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TS: The following teachers and consultants participated in the development of the Supplementary Environmental Education Guide.

SA #3
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CESA #9
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 Harold Baeten, St. Norbert
 Anthony Balistreri, Howard-Suamico
 Lillian Berges, Seymour
 Carmella Blecha, Green Bay
 Joan Charnetski, Sevastopol
 Billie Feichtinger, Green Bay
 Rev. B. Frigo, Abbot Pennings
 Robert Haen, Luxemburg-Casco
 Russ Hanseter, Seymour
 Paul Kane, Ashwaubenon
 Roy Lukes, Gibraltar
 Sister Anna, St. Philips
 Jim Maki, Sturgeon Bay
 Doris Malcheski, Howard-Suamico
 Joyce Mateju, Algoma
 Richard Minten, W. De Pere
 Gloria Morgan, Linsmeier Private
 George Pederson, Southern Door
 Alan Schuh, Pulaski
 Thomas Weyers, Cathedral
 Ruth Windmuller, Green Bay
 James Wiza, De Pere
 John Torgerson, Kewaunee
 Benjamin Roioff, Howard-Suamico
 Greg Schmitt, Cathedral
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 Emmajean Harmann, Sevastopol
 Ray Gantenbein, Green Bay
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 John Hussey, Green Bay
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 , UW-Marinette David West, Lawrence U.

Robert Cook, UWGB
 Dennis Bryan, UWGB

C 1. Energy from the sun, the basic source
 O
 N of all energy, is converted through Discipline Area
 C
 E plant photosynthesis into a form all Subject
 P
 T living things can use for life pro- Problem Orientat
 cesses.

BEHAVIORAL OBJECTIVES	SUGGESTED LE
<p><u>Cognitive:</u> Children will not be careless in a forest environment.</p> <p><u>Affective:</u> Each child will illustrate the cycle of a tree returning to the soil.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Review needs of a healthy tree. Discuss what would happen if the sun ceased to shine. 2. If class does not visit woods area, show slides, filmstrip, or film on falling logs or decaying wood. 3. Make collage of picture plants & animals that live off an original tree. 4. Investigate: <ol style="list-style-type: none"> a. Lift bark-insects, sl b. Discover how decaying wood becomes part of soil c. Grow different fungi: <ol style="list-style-type: none"> 1) bread mold 2) blue mold on fruit 3) bracket fungi on tree find samples. d. Discuss bacteria, and plant living on a tree; one-celled plants that on other plants. Fungi bacteria are the main that cause a tree to decay return to soil. Without eaying, life could not. If there were not substances that returned to soil, plants would have no food.
<p><u>Skills to be Learned</u></p> <p>Investigation</p> <p>Collections of fungi & bacteria</p> <p>Observing growth</p> <p>Discussion</p>	

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is converted through

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Problem Orientation

Sun Energy

Grade

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OBJECTIVES

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Fungi &

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Review needs of a healthy tree. Discuss what would happen if the sun ceased to shine.
2. If class does not visit woods area, show slides, filmstrip, or film on falling logs or decaying wood.
3. Make collage of pictures of plants & animals that live off an original tree.
4. Investigate:
 - a. Lift bark-insects, slugs
 - b. Discover how decaying wood becomes part of soil
 - c. Grow different fungi:
 - 1) bread mold
 - 2) blue mold on fruit
 - 3) bracket fungi on trees - find samples.
 - d. Discuss bacteria, another plant living on a tree; tiny one-celled plants that depend on other plants. Fungi & bacteria are the main plants that cause a tree to decay & return to soil. Without decaying, life could not go on. If there were not substances that returned to soil, green plants would have no food.

II. Outside Resource and Community Activities

1. Visit to wooded area. Look at fallen log. Investigate. Note how the other animals in this environment depend directly or indirectly on plants.

Resource and Reference Materials
Publications:

Ranger Rick Magazine, Wildlife Federation

The True Book of Bacteria by Anne Frahm Children Press, 1963

Once There Was A Tree, Phyllis Bush, World Pub.

Concepts in Science, Brandwein, Cooper, Blackwood, Home.

Audio-Visual:

Films:

How Plants Help Us, 12 min.

McGraw-Hill, BAVI

Life On A Dead Tree, 11 min.

Films Ass. of Calif. BAVI

Animals & Plants of Forests, McGraw-Hill

Filmstrips:

Green Plants Are Important to Us,

Jam Handy Organization

2821 E. Grand Avenue

Community:

Soil Conservationist

Continued and Additional S

Materials

Continued and Additional Suggested Learning Experiences

Life

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C 2. All living organisms interact among
O themselves and their environment,
N
C forming an intricate unit called an
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P ecosystem.
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Discipline Area Science

Subject Science

Problem Orientation Ecosys

BEHAVIORAL OBJECTIVES

Cognitive: Identify 5 plants, and the environmental factors that can sustain & limit their life. List 4 causes of plant deficiencies.
Affective: Students will now tell what they are doing to preserve plant life.

Skills to be Learned

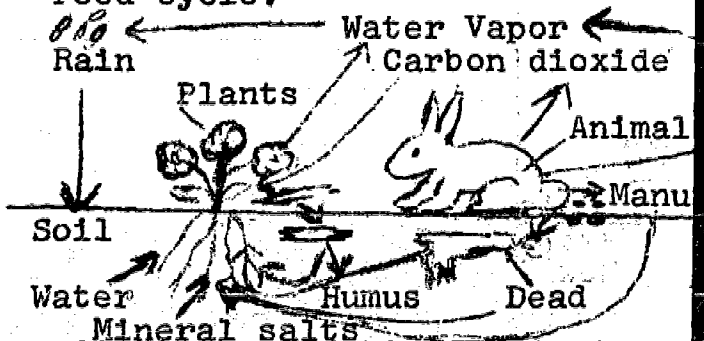
Identification of 5 plants
Observing deficiencies in plant growth

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Class:

1. Construct a terrarium showing that plants can live on light, air, soil, and water.
2. Discuss the following Food Cycle.



3. Discuss the following food chains.
- Decaying plants → Earthworms → Fowl → Man
Diatoms → Water Flea → Minnow → Pike
Grass → Deer → Lion → Lous
- (Sunlight energy is trapped during photosynthesis).

organisms interact among

their environment,

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Problem Orientation Ecosystem Grade 4

OBJECTIVES

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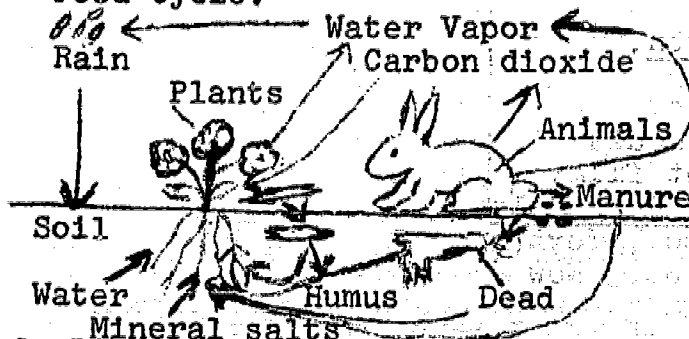
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SUGGESTED LEARNING EXPERIENCES

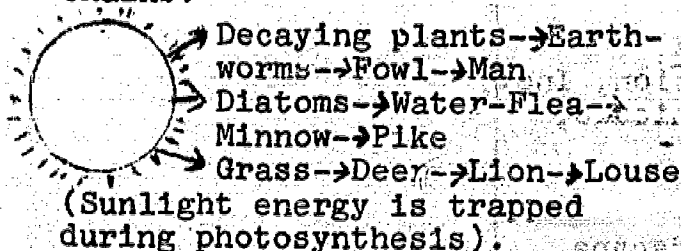
I. Student-Centered in class activity

A. Class:

1. Construct a terrarium showing that plants can live on light, air, soil, and water.
2. Discuss the following Food Cycle.



3. Discuss the following food chains.



II. Outside Resource and Community Activities

A. Outside class

1. Ask children to bring in samples of plants that are unhealthy-looking or discolored. Estimate the causes--plant nutrient deficiencies, insect damage, plant disease, air pollution.
2. Collect many different types of soil (clay, top soil, potting soil, sandy soil) and observe their characteristics & ability to absorb water and to grow plants.
3. Take a class trip to a floral shop or greenhouse.

Resource and Reference Materials
Publications:

Books:

A Crack in the Pavement by Ruth
 Howell
Moving Hills of Sand by Julian
 May
Busy Water by Irma Simonton
Living Things by Jeanne Bendick

Audio-Visual:

Movies:

Nature's Half Acre, BAVI film,
 No. 3479
What Plants Need for Growth,
 BAVI film, No. 5117
Conservation for Beginners,
 Green Bay Instructional Media
 Center, No. 4180 (Coronet film)
We Get Food from Plants and Animals
 McGraw-Hill Publishing Co., Text
 Film Dept., 330 W. 42nd St., New
 York, N.Y. 10036.

Filmstrips:

Learning About Plants, Encyclo-
 pedia Britannica

The World of Living Things,
 Society for Visual Education, Inc.
 1345 Diversey Parkway, Chicago,
 Ill. 60614

Community:

Talk by local florist, landscape
 man or crop farmer

Continued and Additional Suggested

Materials	Continued and Additional Suggested Learning Experiences
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Julian	
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C 2. All living organisms interact among
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Discipline Area Science

Subject Science

Problem Orientation Ecosystem

BEHAVIORAL OBJECTIVES

Cognitive: Define the meaning of fossil. Identify 2 fossil animals. Identify 2 fossil plants.
Affective: Through this lesson the student will now attempt to continue gathering further information on fossils.

Skills to be Learned

Research
Identification
Cause & effect relationships
Comparison & contrast

SUGGESTED LEARNING EXPER

I. Student-Centered in class activity

- A. Make a diorama of the Coal Age Swamp, including the plants & animals.
- B. Read about developments of plants after the Coal Age.

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Problem Orientation Ecosystem Grade 4

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

- A. Make a diorama of the Coal Age Swamp, including the plants & animals.
- B. Read about developments of plants after the Coal Age.

II. Outside Resource and Community Activities

- A. Borrow some fossils from a rock collector, or a local museum. Let the children handle & examine the images of long ago or find pictures of fossil.
- B. Make fossils. Collect various plant parts (leaves & stems, seed pods, bits of bark), animal parts (bones, feathers, shells) and make imprints by pressing them into soft clay. Pour in plaster of paris in clay mold for take-home fossil.
- C. Bring in a backbone cut from a fish. Put in salt water & examine. Help children to relate the backbone from a modern fish to the lung-fish, the first animal with a backbone able to live out of water.
- D. Visit Neville Public Museum, Green Bay, to see the fossils on display. Make reports to class.

Resource and Reference Materials
Publications:

Books:

Concepts in Science Book 2
published by Harcourt, Brace.
Dinosaurs and More Dinosaurs
by M. Jean Craig, published
by Scholastic Book Services,
New York.

In the Days of the Dinosaurs,
by Roy Chapman Andrews,
Scholastic Book Services,
New York.

Audio-Visual:

Movies:

Message from a Dinosaur, G.B.
Instructional Media Center
No. 8106 (Encyclopedia
Britannica)

Fossils are Interesting,
Film Associates of California

Filmstrip:

Prehistoric Man

Community:

Neville Park Museum,
Green Bay, A section on fossils

Continued and Additional Suggested

ials

Continued and Additional Suggested Learning Experiences

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ls

C 3. Environmental factors are limiting
 O on the numbers of organisms living
 C within their influence, thus, each
 P environment has a carrying capacity.

Discipline Area Science
 Subject Birth and
 Problem Orientation Carrying Capacity

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Have students illustrate & label stages of a guppie, salmon, snail, or frog. Students make a list of ways different stages are used or consumed by organisms.</p> <p><u>Affective:</u> Students will question about the reproduction habits of other species.</p>	<p>I. Student-Centered in class activity</p> <p>A. Class work</p> <ol style="list-style-type: none"> 1. Study adult salmon & its spawning behavior through films, filmstrips or texts. Both the male & female swim toward river where it was born. (May be a thousand miles away-takes weeks or months). What are the dangers they encounter on their way back? (Larger fish, fishermen, loss of weight from traveling & eating very little, waterfalls). How do salmon spawn? How do they prepare their spawning nest? What happens to the adults after they spawn? (Die) 2. The young salmon hatches. What endangers do they encounter? (Other fish eat salmon eggs for food). Eggs that land between stones are the protected. When it reaches its (cont.)
<p><u>Skills to be Learned</u></p> <p>Observe life stages</p> <p>Chart</p> <p>Record</p> <p>Examine snail or frog eggs</p>	

1 factors are limiting

of organisms living

fluence, thus, each

a carrying capacity.

Discipline Area Science

Subject

Birth and Life Stages

Carrying

Problem Orientation Capacity

Grade 4

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Class work

1. Study adult salmon & its spawning behavior through films, filmstrips or texts. Both the male & female swim toward river where it was born. (May be a thousand miles away-takes weeks or months). What are the dangers they encounter on their way back? (Larger fish, fishermen, loss of weight from traveling & eating very little, waterfalls). How do salmon spawn? How do they prepare their spawning nest? What happens to the adults after they spawn? (Die)
2. The young salmon hatches. What dangers do they encounter? (Other fish eat salmon eggs for food). Eggs that land between stones are the protected. When it reaches its (cont.)

II. Outside Resource and Community Activities

A. Outside work

1. Bring samples of tuna, salmon, & sardines to eat with crackers. Discuss other water creatures caught by man. Talk about the balance of nature in this connection.

Resource and Reference Materials
Publications:

Books:

The Fisheries Story, George
Shaftel & Helen Heffernon
from the Man Improves His
World series, Singer 1963
Red Tag Comes Back, Arnold
Lobel, Harper & Row, 1961
#4 Concepts In Science-Text
Harcourt, Brace & World

Audio-Visual:

Films:

The Life Story of a Snail,
11 min. EBF
Salmon-Life Cycle of the
Sockeye, 11 min, Hoeffler,
BAVI

Community:

Continued and Additional Suggested
I. (cont.)

size in fall, it stays inside
When it hatches, it takes yolk
food. Young salmon (Parr) 2 ye
called smolt. They head for th

3. Make sequential chart or mura
4. Buy pregnant guppie & contras
happens when not all babies ar
mother?

5. How are salmon & guppies used
6. Observe snails in aquarium. S
shell lay eggs on sides of aqu
spiral pointed shell lay eggs
leaves.

a. Pull eggs off surface or so
medicine dropper. Suck eggs
place in aquarium water in d

b. Examine daily with hand len

1. When does it begin to mo
2. When does it leave egg
3. When hatched, feed bits

7. Frog eggs are laid similar to
If you can purchase or find th

Continued and Additional Suggested Learning Experiences

1. (cont.)

size in fall, it stays inside egg all winter. When it hatches, it takes yolk sac along for food. Young salmon (Parr) 2 years old are called smolt. They head for the ocean.

3. Make sequential chart or mural.

4. Buy pregnant guppie & contrast life. What happens when not all babies are removed from mother?

5. How are salmon & guppies used by people?

6. Observe snails in aquarium. Snails with oiled shell lay eggs on sides of aquarium. Snails with spiral pointed shell lay eggs on under side of leaves.

a. Pull eggs off surface or scrape off with medicine dropper. Suck eggs into dropper & place in aquarium water in dish.

b. Examine daily with hand lens (Chart or Record)

1. When does it begin to move.

2. When does it leave egg

3. When hatched, feed bits of lettuce

7. Frog eggs are laid similar to salmon's.

If you can purchase or find these, observe stages.

C 4. An adequate supply of pure

O water is essential for life.

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Discipline Area _____ Scie

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Water

BEHAVIORAL OBJECTIVES

Cognitive: After a series of experiments, students will give several reasons orally or written from why plants, animals, or people need water.

Affective: The children will advocate clean water for life of all living organisms.

Skills to be Learned

Make model of water-purifying plant

Make booklet

Experiment

Record

Research

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Students may be divided into groups to investigate the different areas. (Students not expected to do all of these)

Model: A water-purifying plant. Needed: funnel, sand, cotton, 1/2" of garden soil in a quart jar, another clean quart jar.

a. Add about a quart of water to the jar with soil, and shake. Let water stand for a while. What happens to soil particles? What happens to the water as the particles settle? (Settling is one way of cleaning water.)

b. Place cotton in funnel & put a layer of sand about an inch deep over the cotton. Put funnel in clean jar. Gently pour some water from settling jar into funnel. What happens to water in funnel? (Clean water by passing thru filter. Particles of soil are filtered out of water by passing thru the sand.)

(Cont.)

Supply of pure

al for life.

Discipline Area Science

Subject Science

Problem Orientation Adequate

Water Supply Grade 4

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Students may be divided into groups to investigate the different areas. (Students not expected to do all of these)

Model: A water-purifying plant. Needed: funnel, sand, cotton, 1/2" of garden soil in a quart jar, another clean quart jar.

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- b. Place cotton in funnel & put a layer of sand about an inch deep over the cotton. Put funnel in clean jar. Gently pour some water from settling jar into funnel. What happens to water in funnel? (Clean water by passing thru filter. Particles of soil are filtered out of water by passing thru the sand.)

(Cont.)

II. Outside Resource and Community Activities

1. Find out where a big city like New York gets its water. (Mountains, streams, rainfall, snow). Area in which streams & rivers collect rain and snow is called a watershed. Sometimes dams are built in a watershed, & the water is stored in a reservoir. Water doesn't move much, so soil & rock particles settle to bottom. Then water goes to purifying plant. (Tour one.) Here, the water is placed in a settling tank. Substances are added to make particles settle more quickly. Then filtered thru sand. Water appears clean but there's bacteria. Water is sprayed into air to kill bacteria. Then chlorine gas kills remaining bacteria. Then it is ready to drink.
2. Take pictures of a marsh. Find out what plants & wildlife live there.

(Cont.)

Resource and Reference Materials
Publications:

Books:

Not Only for Ducks, The Story of
Rain by Glenn Blough, McGraw-
Hill, N. Y., 1954.

Let's Look Under the City by Her-
man & Nina Schneider, William R.
Scott, Pub., N.Y., 1954.

Everyday Weather and How It Works,
Herman Schneider, McGraw-Hill,
N. Y., 1961.

Concepts in Science by Paul
Brandwein, Harcourt, Brace
& World, Inc., Chicago, 1966.

Audio-Visual:

Films:

Water/Old Problems-New Approaches
Time-Life, McGraw-Hill, 30 min.

Water Cycle - 10 min. EBF BAVI

Water Supply - 10 min. Academy,
BAVI

Filmstrips:

407-4 Underwater Animals -
Imperial Film Co.

645-3 Bodies of Water -
I.F.C.

Community:

Water purifying plant
Site of well being drilled
Creek

City Water Tower

Continued and Additional Suggested I

I. (Cont.)

2. Model: Watershed. Make mountain
imprints made in mountain (when
tral location (reservoir). Watch
soil and rock particles settle.

3. Find out how farmers or ranchers
Well drillers sink a metal pipe
water rises in the pipe. (Visit

4. Booklet: "Water Is Essential."
written stories and poems.

5. Experiment: Foods have water
potato, meat, milk, orange). Ne
bag, paper towel, tray. a. Weigh
Record.

b. Cut apple into small pieces
quickly. Put apples on tray &

c. Leave in sunlight for several
evaporate from the piece of a

d. Weigh the dried-out pieces.
weight of water lost by the a

6. Record Keeping: Animals Need W
track of how much water the chi
record how much different anima
length of time. Pen the animal
Weigh amount of water before pl

7. Research project: Report on an
lives in the water.

8. Water a plant. Tie a plastic o
to the water. b

II. (Cont.)

3. Trip to nearby creek to see pl
of water. Note water lilies. St
scope. Notice how heavy soil pa
bottom. Have children bring sam
near home. Compare. Use microsc

Materials	Continued and Additional Suggested Learning Experiences
<p>History of Graw-</p> <p>by Her-</p> <p>William R.</p> <p>It Works,</p> <p>-Hill,</p> <p>ul</p> <p>ce</p> <p>1966.</p> <p>proaches</p> <p>30 min.</p> <p>BAVI</p> <p>ademy,</p>	<p>I. (Cont.)</p> <ol style="list-style-type: none"> 2. Model: Watershed. Make mountain of ground with river imprints made in mountain (where river flows) to a central location (reservoir). Watch water in reservoir as soil and rock particles settle to bottom. 3. Find out how farmers or ranchers get water. (Well). Well drillers sink a metal pipe into layer of rock. The water rises in the pipe. (Visit site of well drilling.) 4. Booklet: "Water Is Essential." Include pictures and own written stories and poems. 5. Experiment: Foods have water in them. (Use apple, egg, potato, meat, milk, orange). Needed: apple, knife, plastic bag, paper towel, tray. a. Weigh apple on ounce scale. Record. <ol style="list-style-type: none"> b. Cut apple into small pieces so it will dry out more quickly. Put apples on tray & place in sunlight c. Leave in sunlight for several days. Water will evaporate from the piece of apple. d. Weigh the dried-out pieces. Record. Then calculate weight of water lost by the apple. 6. Record Keeping: Animals Need Water. Besides keeping track of how much water the child drinks have him record how much different animals drink in a specific length of time. Pen the animal up in a cage or fence. Weigh amount of water before placing before animal. 7. Research project: Report on animal or plant that lives in the water. 8. Water a plant. Tie a plastic over it. What happens to the water. bag <p>II. (Cont.)</p> <ol style="list-style-type: none"> 3. Trip to nearby creek to see plant life and take sample of water. Note water lilies. Study water under microscope. Notice how heavy soil particles settle to the bottom. Have children bring samples of water from creeks near home. Compare. Use microscope.

C 5. An adequate supply of clean air is

O
N essential because most organisms

Discipline Area Science

C
E depend on oxygen, through respiration,

Subject

Science

P
T to release the energy in their food.

Problem Orientation Clean A

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPER

Cognitive: Teacher displays pictures or draws several cloud formations. Children write a possible weather condition for each formation. Children select from a list of contaminants, which are problems locally.

Affective: The child will be trying to predict the weather by looking at the clouds. He will be cautious in his behavior & will be alerted to the community's air pollution problem.

Skills to be Learned

Experiments
Observation
Charts

I. Student-Centered in class activity

A. Many of these activities are optional or the children can work in pairs. Entire class does activity No. 3.

1. Experiment: Warm air rises. (Before doing experiment discuss the fact that smoke rises from fire as seen by factory smokestacks, campfires, house chimneys, exhaust from tractor muffler or boat, etc.) Needed: 2 balloons, 2 pans, a pop bottle, tape measure, Hot & cold water.

- Put a few drops of water in the pop bottle.
- Put balloon over the mouth of the bottle.
- Put hot water in a pan. Place bottle in water. What happens to the balloon? (Inflates & rises--warm air rises).
- Then put bottle in second pan of cold water. What happens to the balloon? (deflates)
- Place bottle in direct sunlight. Predict what will happen.

2. (By way of pictures) Which is warmer on a hot day--a sandy beach or the water? (sand) (cont.)

II

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most organisms Discipline Area Science
through respiration, Subject Science
ergy in their food. Problem Orientation Clean Air Grade 4

OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

- A. Many of these activities are optional or the children can work in pairs. Entire class does activity No. 3.
1. Experiment: Warm air rises.
(Before doing experiment discuss the fact that smoke rises from fire as seen by factory smokestacks, campfires, house chimneys, exhaust from tractor muffler or boat, etc.) Needed: 2 balloons, 2 pans, a pop bottle, tape measure, Hot & cold water.
 - a. Put a few drops of water in the pop bottle.
 - b. Put balloon over the mouth of the bottle.
 - c. Put hot water in a pan. Place bottle in water. What happens to the balloon? (Inflates & rises-warm air rises)
 - d. Then put bottle in second pan of cold water. What happens to the balloon? (deflates)
 - e. Place bottle in direct sunlight. Predict what will happen.
 2. (By way of pictures) Which is warmer on a hot day-a sandy beach or the water? (sand) (cont.)

II. Outside Resource and Community Activities

- A. Visit a city incinerator. What can be burned in it? It is a air-pollution control. (Designed to consume waste materials & resulting gases completely). Compare burning at a dump & pollution it causes.
- B. Experiment: Air Pollution. Punch hole in 3x5 card. Cover hole with scotch tape. Tape card to a tree, house, school, post, etc with sticky side outward for 8 hrs. Use hand lens or microscope to study particles on the tape.
- C. Slides of local industrial sites giving off pollutants may be shown.
- D. Local area skin-diver come in & display his equipment.
- E. Make 2 bulletin boards-
 1. Causes of Air Pollution
 2. Results of Air Pollution

Resource and Reference Materials Publications:

Books:

- Everyday Weather & How It Works,
by Herman Schneider, McGraw-Hill,
1961.
- Clean the Air by Lewis, McGraw-
Hill, N.Y., 1965.
- Let's Go to Stop Air Pollution,
Michael Chester, Putnam, 1970.
- Newspapers & Current Events Mag.

Audio-Visual:

Films:

- What Makes Weather, Color,
14 min. (Cenco)
- What Makes Clouds, Color,
19 min. (EBF) BAVI
- Air Around Us, Color, 12 min.,
(John Colburn) BAVI
- A Day at the Dump, Stuart
Finley, Inc, 15 min., free
from U.S. Dept. of H.E.W.
#M-1600-X

Filmstrip:

- What is Air Pollution? Multi-
Media Prod. Inc.
- Air Pollution and You, U.S.
Dept. of H.E.W. - Free loan
- Large cardboard pictures -
Curriculum Color Prints-Inst.
Aids Inc., 1964.

Community:

- City Incinerator
Airplane pilot
Airport
Skin diver

Continued and Additional Suggested I. I. (cont.)

- Therefore, the air over the beach is warmer than the air over the water. The warmer air rises & pushes it up. Remember there is cooler air from over the water. As the warm air rises, it becomes colder, condenses & turns to water. When tiny droplets combine, they form clouds.
3. Study cloud formations. Take pictures in magazines of different cloud formations. Cirrus, Stratus, Cumulus, Nimbus. Make list of each form & type of weather.
 4. 2 big oceans. Ocean of water & ocean of air (air is hundreds of miles deep & covers the earth in it all the time). Make list of things in the ocean of air. (It's endless).
 5. Find out how astronauts & skin divers get necessary air. Have library display.
 6. Four layers of air are: Troposphere, Stratosphere, Mesosphere, Ionosphere, exosphere. Where do clouds form? (1) Where does jet airliners fly? (2) Where do meteorites bounce off back to earth? (3) Where do sun's rays stop? (3) Which stops meteorites? (3) Where is there no air? (4) Which is the beginning of space?
 7. List the contaminants in the air: pollen, mist, vapors, sprays, smoke. Make picture showing the source of the contaminants.
 8. Study about smog. Why is it harmful? Which cities are most affected? What causes smog?
 9. List reasons why we must control air pollution: sinus trouble, TB, pneumonia, cancer, acid rain poisons plants life, acid rain causes metals to wear away, smog causes clothes, curtains & furniture to become brittle, to pollute the air? (coal) What

e Materials	Continued and Additional Suggested Learning Experiences
<p>ow It Works, McGraw-Hill, s, McGraw- Pollution, nam, 1970. Events Mag.</p> <p>Color, olor, 12 min., tuart , free H.E.W.</p> <p>n? Multi- a, U.S. ree loan res - nts-Inst.</p>	<p>I. (cont.)</p> <p>Therefore, the air over the beach is warmer than the air over the water. The warmer air rises above the sand because cooler air from over the water flows in & pushes it up. Remember there's water vapor in the air from over the water. As the warm air rises it gets colder, condenses & turns to water in a cloud. (like fog) When tiny droplets combine, they fall as raindrops.</p> <ol style="list-style-type: none"> 3. Study cloud formations. Take photographs or slides. Find pictures in magazines of different forms of clouds. Chart: Cirrus, Status, Cumulus, Nimbus. Write characteristics of each form & type of weather one can predict from these. 4. 2 big oceans. Ocean of water & ocean of air (larger-hundreds of miles deep & covers all the earth-we walk in it all the time). Make list of things you can do in the ocean of air. (It's endless). 5. Find out how astronauts & skin divers get their necessary air. Have library display of these areas. 6. Four layers of air are: Troposphere, stratosphere, ionosphere, exosphere. Where is the most air? (1) Where do clouds form? (1) Where does dust pollution stay? (1) Where do jet airliners fly? (2) Where do radio waves bounce off back to earth? (3) Which shields us from the sun's rays? (3) Which stops meteors that shoot into the atmosphere? (3) Where is there the least air resistance? (4) Which is the beginning of space? (4) 7. List the contaminants in the air: dust, smoke, lint, fog, pollen, mist, vapors, sprays, gases. Children draw a picture showing the source of the pollution. (May be cartoon) 8. Study about smog. Why is it hazardous to health? What cities are most affected? What is smog composed of? What causes smog? 9. List reasons why we must control smoke pollution. (causes sinus trouble, TB, pneumonia, cuts off sunlight, sulfuric acid poisons plants life, harms outside of buildings, causes metals to wear away, smoke stains, smudges on clothes, curtains & furniture) What is the worst mineral to pollute the air? (coal) What are substitutes for coal?

C 6. Natural resources are not equally

O distributed over the earth or over

C time and greatly affect the geographic

P conditions and quality of life.

Discipline Area _____ Sc

Subject _____ Sc

Problem Orientation _____ Re

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Giving each child an outline map of Wisconsin, he will fill in the areas where specific resources are found.</p> <p><u>Affective:</u> Child will be enthused to share with the class his observations of area resources he has encountered on family excursions.</p>	<p>I. Student-Centered in class activities</p> <p>1. Diarama: Natural Resources. Include sunshine, air, water, soil, minerals, forest, wildlife. (These are 7 principle classes.)</p> <p>2. Give students 4 outline maps of Wisc. Show variations in population, rainfall, growing season, economic activity. How are these factors interrelated?</p> <p>3. Mural: Wildlife of Wisc. Include mammals, fish, birds & waterfowl. Report on state animal-badger, state bird-robin, state fish-muskellunge. Or choose any other wildlife for a report.</p> <p>4. Research: list 10 largest cities of Wisc. from largest to 10th largest. Notice where they are located. (Near lake or river) Why? What is manufactured in these cities?</p> <p>5. Compare Wisc. natural resources with other states by way of report.</p> <p>6. Look in catalog or magazine for pictures showing how we save fuel. (storm windows, double doors). (Cont.)</p>
<p><u>Skills to be Learned</u></p> <p>Mapmaking</p> <p>Murals & diaramas</p> <p>Survey of community</p> <p>Learn names of wildlife and animals in his environment.</p>	

es are not equally

he earth or over Discipline Area Science
ffect the geographic Subject Science
lity of life. Problem Orientation Resources Grade 4

CTIVES	SUGGESTED LEARNING EXPERIENCES	
ach of ill pec- ound. ll be th the ns of as en- ex-	<p>I. Student-Centered in class activities</p> <ol style="list-style-type: none">1. Diarama: Natural Resources. Include sunshine, air, water, soil, minerals, forest, wild-life. (These are 7 principle classes.)2. Give students 4 outline maps of Wisc. Show variations in population, rainfall, growing season, economic activity. How are these factors interrelated?3. Mural: Wildlife of Wisc. Include mammals, fish, birds & waterfowl. Report on state animal-badger, state bird-robin, state fish-muskellunge. Or choose any other wildlife for a report.4. Research: list 10 largest cities of Wisc. from largest to 10th largest. Notice where they are located. (Near lake or river) Why? What is manufactured in these cities?5. Compare Wisc. natural resources with other states by way of report.6. Look in catalog or magazine for pictures showing how we save fuel. (storm windows, double doors).(Cont.)	<p>II. Outside Resource and Community Activities</p> <ol style="list-style-type: none">1. Survey of farms in area. (Owner, number of acres, names of number of each animal, crops planted)2. Field trip to a farm to observe plowing that prevents erosion. Also forest lands and grassy areas left alone will stop erosion because the roots hold the soil. Experiment: Pull up weeds and look at their roots. (soil is on roots) Have a geranium plant. Hold the plant & carefully tap the pot on the side to loosen the soil. Lift plant out of pot - the soil is on roots.
life environ-		

Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u></p> <p><u>Milwaukee Journal Pub. Wisc.</u> <u>Almanac, free to schools, Jan. or</u> <u>Feb. - once a year.</u></p> <p><u>Books:</u></p> <p><u>About Saving Wildlife for Tomorrow</u> <u>by Solveig, Mulmont Pub., Chicago</u></p> <p><u>The First Book of Wildlife Sanctuaries</u> <u>by Harrison, Watts of New York.</u></p> <p><u>Man Improves His World by Hefferman-</u> <u>Shaffel, L.W. Singer Co., Syracuse.</u></p>	<p>I. (Cont.)</p> <p>7. Class may research: <u>Resources Imported</u> <u>From Other States</u> <u>oil, coal, iron, etc.</u></p> <p>8. Compare seasonal changes <u>Wisconsin. (Use of land, s</u></p> <p>9. List hardwood and softwo <u>to recognize the names of</u> <u>wood products & uses by wi</u> <u>Label the trees on a natur</u> <u>each. Make leaf collection</u> <u>Lumber and From Trees to P</u></p> <p>10. The boys will enjoy rela <u>What kinds of fish did the</u> <u>for bait? Girls can look f</u> <u>Make a recipe booklet.</u></p>
<p><u>Audio-Visual:</u></p> <p><u>Films:</u></p> <p><u>Wisconsin Agriculture, color,</u> <u>17 min., BAVI</u></p> <p><u>Wisconsin Geography, An Introduction</u> <u>color, 18 min., BAVI</u></p> <p><u>Wisconsin: Its People, Its Products</u> <u>Its Place in the World, color,</u> <u>Carson, BAVI</u></p> <p><u>Wisconsin Manufacturing and Mining</u> <u>color, 20 min., BAVI</u></p> <p><u>Wisconsin's Great Lakes Fishermen,</u> <u>color, 20 min., BAVI</u></p> <p><u>From Trees to Lumber, color, 14 min.</u> <u>American Forest Products Industry,</u> <u>BAVI</u></p> <p><u>From Trees to Paper, color, 12 min.</u> <u>Am. Forest Prod. Industry, BAVI</u></p>	
<p><u>Community:</u></p> <p><u>Wisconsin Dept. of Natural Resources</u> <u>Conservation Division, Box 450</u> <u>Madison, Wisconsin 53701</u></p>	

Ice Materials	Continued and Additional Suggested Learning Experiences		
<p>Wisc. ools, Jan. or e for Tomorrow Pub., Chicago ldlife Sanctuaries of New York. ld by Hefferman- r Co., Syracuse.</p> <p>e, color,</p> <p>An Introduction</p> <p>I e, Its Products rld, color,</p> <p>ing and Mining</p> <p>I kes Fishermen,</p> <p>I , color, 14 min. ducts Industry</p> <p>color, 12 min. dustry, BAVI</p> <p>tural Resources , Box 450 3701</p>	<p>I. (Cont.)</p> <p>7. Class may research:</p> <table border="0"> <tr> <td>Resources Imported From Other States oil, coal, iron, etc.</td> <td>Resources Imported From Foreign Countries rubber, bananas, coffee, sugar, oil, etc.</td> </tr> </table> <p>8. Compare seasonal changes in the life of a person of Wisconsin. (Use of land, sports, clothing, travel, farming)</p> <p>9. List hardwood and softwood trees of Wisconsin. Learn to recognize the names of the most popular and their wood products & uses by wildlife. Take a nature walk. Label the trees on a nature walk by placing a tag on each. Make leaf collections. Show films <u>From Trees to Lumber</u> and <u>From Trees to Paper</u>.</p> <p>10. The boys will enjoy relating experiences of fishing. What kinds of fish did they catch? What did they use for bait? Girls can look for recipes of preparing fish. Make a recipe booklet.</p>	Resources Imported From Other States oil, coal, iron, etc.	Resources Imported From Foreign Countries rubber, bananas, coffee, sugar, oil, etc.
Resources Imported From Other States oil, coal, iron, etc.	Resources Imported From Foreign Countries rubber, bananas, coffee, sugar, oil, etc.		

C 7. Factors such as facilitating transportation,
 O
 N economic conditions, population growth, Discipline Area Science
 C
 E and increased leisure time have a great Subject Science
 P influence on changes in land use and Problem Orientation Transport
 T centers of population density. Leisure

BEHAVIORAL OBJECTIVES

Cognitive: Given a road map of Wisconsin, a child can locate places of interest to visit. Densely populated areas are circled.
Affective: Children will voluntarily write "My Vacation Story", supporting their choice of a vacation at a seashore, farm, city, mountains, etc.

Skills to be Learned

Study road maps
 Letter writing to a factory
 Creative writing
 Surveying

SUGGESTED LEARNING EXPERIENCES

- | I. Student-Centered in class activity | II. Out of class activity |
|---|---------------------------|
| A. Classroom
1. Road map of Wisconsin or a chart to plot interesting places to visit.
a. Baraboo - Ringling Bros. Circus
b. Cave of the Mounds - cavern
c. Menominee - Indian Reservation
d. Madison - capital
e. Eagle River - forests
f. Door County - cherry-land
g. Green Bay - Packers
h. Milwaukee - Old Milw. days, museum
i. Rib Mountain - highest elevation
j. Etc.
2. Why would you choose to visit these places? How would you travel? Draw route on road map. Compute the number of miles from your home. How many miles per gallon of gas does your car get? How much money would the (cont.) | A. |
| | B. |

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Problem Orientation Leisure Time Grade 4

JECTIVES

SUGGESTED LEARNING EXPERIENCES

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 - j. Etc.
 2. Why would you choose to visit these places? How would you travel? Draw route on road map. Compute the number of miles from your home. How many miles per gallon of gas does your car get? How much money would the (cont.)

- II. Outside Resource and Community Activities
- A. Outside classroom
1. Visit a near-by resort. What recreational facilities does it offer to the tourists? How does the tourist industry help this resort community? Is it a tourist attraction all year around? Will the sportsman enjoy himself? Are there evidences of pollution or carelessness?
 2. Send for postcards & make up a booklet on the national & state parks of Wisconsin.
- B. Library
1. Read history books to find out why cities like Milwaukee, Green Bay, Madison, etc. were begun. (Fur trading centers located near water) What industries are there now? Is water still as important for transportation or has another means taken its place?

Resource and Reference Materials
Publications:

Audio-Visual:

Films:

Wisconsin's Recreational Resources

A Study in Economic Geography,

Color, 23 min., Univ. of Wis.,

BAVI

Wisconsin Interstate Highways,

Color, 15 min. Univ. of Wis.,

BAVI

The Milwaukee Way, Color, 52 min.,

Univ. of Wis., BAVI

Wisconsin History: Pre-Statehood,

Color, 20 min., Univ. of Wis.,

BAVI

Community:

Factory

Tour of large city

Highway commissioner & county

highway building

Chamber of Commerce

Continued and Additional Suggested

I. (cont.)

gasoline cost? What other exp
encounter?

3. Make poster about good manne
general outdoor manners.

4. List use of land in a city &
in country. (Name 2 familiar
and the other in the country)
to the country? Why do countr

5. Report on a product made in
Child shall write to his sele
information. (Number of emplo
where raw materials come from
product, source of power, wha
materials, & in some cases th
a guided tour of the industry
factory in operation to see i

6. Show filmstrip or slides abo
population? If every family o
& had a family of 4, how many
This would be unreal, so how
conserve space? (tall buildin
diarama - include highways, i
houses & skyscrapers, recreat
and traveling vehicles.

7. Show film on highway constru
used? Does it destroy valuabl
areas? How will the new highw
Ask highway commissioner to t
chosen & tell about his job.
building to see machinery. Vi

8. Make survey chart: Where Dad
Dad's Where No. of miles
Name Employed to work

This will indicate that dad l
of his work. Does he lessen p
others? You can make up more
significant.

Materials	Continued and Additional Suggested Learning Experiences
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I. (cont.)

gasoline cost? What other expenses would you encounter?

3. Make poster about good manners while on a trip or general outdoor manners.
4. List use of land in a city & then list uses of land in country. (Name 2 familiar areas - one in the city and the other in the country) Why do city people come to the country? Why do country people go to the city?
5. Report on a product made in a Wisconsin factory. Child shall write to his selected factory asking for information. (Number of employees, products made, where raw materials come from, cost of finished product, source of power, what they do with their waste materials, & in some cases the children may ask to have a guided tour of the industry or a picture of the factory in operation to see if there is pollution.)
6. Show filmstrip or slides about Milwaukee. What is the population? If every family owned a ranch style home & had a family of 4, how many homes would be needed? This would be unreal, so how has man adapted cities to conserve space? (tall buildings) Make a large city diarama - include highways, industry & business places, houses & skyscrapers, recreational areas, many people and traveling vehicles.
7. Show film on highway construction. What machinery is used? Does it destroy valuable land, timber or water areas? How will the new highway affect the community? Ask highway commissioner to tell why that site has been chosen & tell about his job. Visit county highway building to see machinery. View roads under construction.
8. Make survey chart: Where Dad Works

Dad's Name	Where Employed	No. of miles to work	Method of Transportation	How long it takes to travel
This will indicate that dad lives within commuting distance of his work. Does he lessen pollution by riding with others? You can make up more titles to the chart that are significant.				

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8. Cultural, economic, social, and
political factors determine status
in man's values and attitudes
toward his environment.

Discipline Area _____ Scien
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 Problem Orientation _____ Attit

BEHAVIORAL OBJECTIVES

Cognitive: By means of an essay question - choice of three - relate how man's values and attitudes have changed toward transportation, detergents, or smoking.
Affective: Children will show interest by relating an act to the home and try to constructively influence attitudes in their home about transportation, phosphate detergents, & smoking.

Skills to be Learned

Comparisons
 Experiment with phosphate

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Plant grass seed in flat cake pan. When grass shoots are seen, take toy snowmobile & drive back & forth. What happened? Why? Why did teacher do this? Does this happen in large scale situation? Compare this to the minibike situation in summer. How do other areas of transportation affect environment: rail, car, etc.
 2. Teacher leave room - come back with a dirty or spotted article of clothing. Discuss attitudes of our culture about cleanliness. "Cleanliness is next to holiness."
 3. Discuss phosphate pollutants. Consult issue of Conservation Ed. Assoc. issue "Guidelines for Citizen Action on Environmental Action" Contains a list of detergents & their percentage of phosphates. Memo of list to send home.
 Experiment making suds in sink. Observe how much water is used to get rid of suds from sink. (Cont.)

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SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class activity

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Experiment making suds in sink. Observe how much water is used to get rid of suds from sink.

(Cont.)

II. Outside Resource and Community Activities

1. Car mechanic could relate importance of keeping car well-tuned to emit less pollutants.

2. Guest speaker to talk on water phosphate problem.

phate

Continued and Additional Suggested Learning Activities:

I. (Cont.)

4. Have children relate experiences of closed environment as a room, or car or smokers have caused room to be smoky. "Average New Yorker inhales air equivalent of 10 cigarettes a day." Adding to this will be effect on his health & to his environment.

5. Impress that only a few years ago, was not criticized. Then give examples attitudes have changes.

Figure 1. The effect of the number of trials on the number of correct responses. The number of correct responses was significantly higher than the number of incorrect responses for all groups. The number of correct responses was significantly higher than the number of incorrect responses for all groups. The number of correct responses was significantly higher than the number of incorrect responses for all groups.

Figure 1. The effect of the number of trials on the number of correct responses. The number of correct responses was significantly higher than the number of incorrect responses in all cases. The number of correct responses was significantly higher than the number of incorrect responses in all cases. The number of correct responses was significantly higher than the number of incorrect responses in all cases.

1. *Journal of the American Medical Association*, 273: 1033-1034, 1995.

1. *Journal of the American Medical Association*, 2000; 283: 2686-2692.

1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 26

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[illegible]

the 1990s, the number of people in the world who are undernourished has declined from 1.1 billion to 800 million. The number of people who are malnourished has declined from 1.5 billion to 1 billion. The number of people who are obese has increased from 100 million to 300 million. The number of people who are overweight has increased from 100 million to 300 million. The number of people who are obese and overweight has increased from 100 million to 300 million. The number of people who are obese and overweight has increased from 100 million to 300 million.

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Materials	Continued and Additional Suggested Learning Experiences
Guidelines	I. (Cont.)
Environmental	4. Have children relate experiences of being in a closed environment as a room, or car, where a smoker or smokers have caused room to be smokey & stuffy. "Average New Yorker inhales air equivalent to 38 cigarettes a day." Adding to this will add to problems of health & to his environment.
RMC	5. Impress that only a few years ago, adult smoking was not criticized. Then give examples how cultural attitudes have changes.
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C 10. Short-term economic gains may
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 E losses.
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Discipline Area S

Subject S

Problem Orientation

BEHAVIORAL OBJECTIVES

Cognitive: Set up a paper display of white & colored tissue, toweling & napkins. Choose the less pollutants. Give reasons why cars are air-pollutants.
Affective: He will not waste paper. He may influence his parents when buying a new car, paper products & groceries by a questionnaire. Evaluate the class results.

Skills to be Learned

Demonstration
 Field trips
 Filling out questionnaires

SUGGESTED LEARNING

- I. Student-Centered in class activity
 - A. Classroom
 1. Discuss factories produce colored tissue, colored toweling or napkins. Dye released pollute streams visually & biologically discoloring the water. Why people buy them because are attractive. Demonstrate
 - a. Soak colored tissue, or napkin in a container of water. Does water become discolored? Also soak white ones & compare.
 - b. Get Rit dye and dye a piece of material. Water turns color. Pour into larger container of water (as factory pours dye-water into a stream)
 - c. Encourage children to explain to others why they should use white rather than colored papers, etc.

long-term economic gains may

long-term environmental

Discipline Area Science

Subject

Science

Problem Orientation Air Pollution Grade 4

ORAL OBJECTIVES

Set up a paper white & colored toweling & napkins. Less pollutants. Why cars are pollutants. He will not. He may. His parents when new car, paper groceries by. Evaluate results.

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tion

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at questionnaires

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Discuss factories producing colored tissue, colored toweling or napkins. Dyes released pollute streams visually & biologically by discoloring the water. Yet people buy them because they are attractive. Demonstration:
 - a. Soak colored tissue, paper or napkin in a container of water. Does water become discolored? Also soak white ones & compare.
 - b. Get Rit dye and dye a piece of material. Water turns color. Pour into a larger container of water (as factory pours dye-color water into a stream)
 - c. Encourage children to tell others why they should use white rather than colored papers, etc.

II. Outside Resource and Community Activities

A. Outside classroom

1. Discussion: Cars are the chief cause of air pollution because they use gasoline & oil for fuel. Take a trip to local new car garage. Ask car dealer to point out the air pollution control equipment. Compare the cars' engine. Generally, the cars with the smaller engines cause less pollution than the larger & more powerful ones. Do not let the car idle. Have scheduled check-up for it.
2. Let pupils stand by the muffler of the car or bus. Start the vehicle. Smell the exhaust. Make sure you do not do this too long.

Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u> <u>Ranger Rick</u>, National Wildlife Foundation Cons. Ed. Assoc. Pub. available from ICE people</p> <p><u>Audio-Visual:</u> <u>Films:</u> <u>From Trees to Paper</u>, B&W, 12 min., Am. Forest Products Indus. BAVI <u>The Cars In Your Life</u>, McGraw-Hill</p> <p><u>Community:</u> Automobile dealer Paper mills</p>	

C 11. Individual acts, duplicated
 O
 N or compounded, produce significant
 C
 E environmental alterations over time.
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Discipline Area Sci
 Subject Sci
 Problem Orientation C

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> After completing a variety of activities, the student will be aware of how individuals alter the environment.</p> <p><u>Affective:</u> The teacher will make a list of words from studies about environment, and the children will check those which make them feel good. e.g. Billboards, flowers, blacktop, trees, sky, litter, etc.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Diarama of non-living things & buildings: farm or city scene. (It doesn't appear attractive.) Then place trees, flowers & bushes, it improves appearance of farm or city 2. Bulletin board of birds. Each child "shoots" a bird with a pretend gun which will decrease bird population. Also, gun noise will scare other birds away. Then one cannot enjoy birds in their habitat. 3. Some people water lawns. your lawn or yard be "natural". Collect water that would be sprinkled on a lawn in 2 m. Calculate to see how much is needed in 1 hour. (Cleaning water is a scarce commodity it must go through its end cycle & each time around it picks up pollutants of various kinds.) 4. Compare amount of water used taking a bath or a shower. taking a shower, put stopper down to catch the water.
<p><u>Skills to be Learned</u></p> <p>Observation Diarama Demonstration Experiments</p>	

1 acts, duplicated

1, produce significant

Discipline Area Science

alterations over time.

Subject Science

Problem Orientation Conservation Grade 4

OBJECTIVES

After completing activities, the student will be aware of how the teacher will

words from environment, then will check the billboards, top, trees, etc.

learned

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Diarama of non-living things & buildings: farm or city scene. (It doesn't appear attractive.) Then place trees, flowers & bushes, it improves appearance of farm or city.
2. Bulletin board of birds. Each child "shoots" a bird with a pretend gun which will decrease bird population. Also, gun noise will scare the other birds away. Then one can not enjoy birds in their habitat.
3. Some people water lawns. (Let your lawn or yard be "natural") Collect water that would be sprinkled on a lawn in 2 min. Calculate to see how much water is needed in 1 hour. (Clean water is a scarce commodity. Now it must go through its endless cycle & each time around it picks up pollutants of various kinds.)
4. Compare amount of water used in taking a bath or a shower. When taking a shower, put stopper plug down to catch the water. (cont.)

II. Outside Resource and Community Activities

A. Outside classroom

1. Take a ride in the countryside & take slides of billboards that distract the natural environment.
2. Demonstration: Each child finds something he no longer wants & litters it on the school yard. (Makes a mess) Have art class design litter barrels & pick up litter & place in attractive litter barrels.

Resource and Reference Materials
Publications:

The Conservation Ed. Assoc.
Box 450, Madison, Wis. 53701

Audio-Visual:

Films:

The Gifts, Color CESA 9 Office,
1927 Main Street, Green Bay
54301 Film 280

Garbage, Color CESA 9 Office
Film 260

Community:

Bus ride to observe billboards

Walk in community

Game Warden

Mother

Forester

Continued and Additional Sugges

I. (cont.)

Mark with tape. Ten take a
water used. Afterwards, us
amount of water.

5. Experiment: Bring samples
Mix them with water. Obser
Use detergents which produ
phosphates. (Phosphates pr
other water plants.) Ditto
about content of phosphate
Citizen Action on Environm
The Conservation Education
Madison, Wisconsin 53701.

6. Paper & metal can drive t

7. Bulletin board of wild fl
them. Take nature walk in
one pick them?

8. Forest fires deplete tree
Search for products made o
kit.

Materials	Continued and Additional Suggested Learning Experiences
<p>3701</p> <p>Office, Bay</p> <p>Office</p> <p>boards</p>	<p>I. (cont.)</p> <p>Mark with tape. Ten take a bath. Compare amount of water used. Afterwards, use method that uses least amount of water.</p> <p>5. Experiment: Bring samples of different detergents. Mix them with water. Observe suds & color of water. Use detergents which produce less foam & few phosphates. (Phosphates promote growth of algae & other water plants.) Ditto chart to give to mothers about content of phosphates in soap. "Guidelines for Citizen Action on Environment Problems". Address: The Conservation Education Association, Box 450, Madison, Wisconsin 53701.</p> <p>6. Paper & metal can drive to encourage recycling.</p> <p>7. Bulletin board of wild flowers. Learn to recognize them. Take nature walk in springtime. Why shouldn't one pick them?</p> <p>8. Forest fires deplete tree products. List its products. Search for products made of wood. Get Smokey the Bear kit.</p>

C 12. Private ownership must be re-
 O
 N garded as a stewardship and should
 C
 E not encroach upon or violate
 P
 T the individual right of others.

Discipline Area Sc

Subject Sc

Problem Orientation

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Child lists several things in his environment that cause noise pollution. Child enumerates steps he must take before applying the pesticide; teacher writes directions on board.
Affective: Child will turn off electrical appliances when not in use. He will be conscious of his noise distractions, and learn to self-discipline himself to work in a quiet manner. He will tell his parents to follow directions on pesticides.

Skills to be Learned

Tape recording
 Campaign to fight pollution
 Following directions given on a container

SUGGESTED LEARNING

- I. Student-Centered in class activity
 - A. Demonstration: Noise pollution will affect persons' mental health. Make tape recordings of different environments: playground, classroom, bus ride, lunchroom, phy. ed class, music, rhythm band, singing, clapping, tapping, etc.
 - B. Which would be considered noise pollution? (continuous exposure to loud noise)
 - C. Organize a "Save a Watt" campaign. Exchange light bulbs not used for reading with lower wattage bulbs. Lower electrical power consumption reduces operating costs and thermal water pollution at the generating plant. Shut off lights when not in room.
 - D. Find out how much the school's electric bill is. After "save a Watt" campaign, compare the differences.

(cont)

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Discipline-Area Science

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Subject Science

right of others.

Problem Orientation Pollution

Grade 4

OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class
activity

A. Demonstration: Noise
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used for reading with
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Lower electrical power
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generating plant. Shut off
lights when not in room.

D. Find out how much the
school's electric bill is.
After "save a Watt" cam-
paign, compare the diff-
erences.

(cont.)

II. Outside Resource and
Community Activities

A. Have the meter reader
come in and tell about
his job.

ned

at pollution
tions given

Resource and Reference Materials
Publications:

The Conservation Ed. Association
Box 450 - Madison, Wis. 53701

Audio-Visual:

Films:

Electricity and How it is Made
16 MIN. Color (EBF) BAVI

Insect Enemies and their Control
11 MIN. Color Coronet BAVI

Community:

Nuclear Plant
Public Service Meter Reader
Nursery
Home to observe electrical
appliances

Continued and Additional S

Student-Centered in class a
E. Survey of their home: a
F. What rules must be obse
Use only recommended dos
year; use nothing contain
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or water. Why must one
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with blemishes caused by
Farmers are often forced
merely to save the appea
How do pesticides affect

ce Materials

Continued and Additional Suggested Learning Experiences

Association
s. 53701

Student-Centered in class activity (cont.)

E. Survey of their home: all electrical appliances

F. What rules must be observed when using pesticides?

Use only recommended dosage; use at proper time of year; use nothing containing lead, mercury, or arsenic; don't let it get on your skin; don't apply near food or water. Why must one be so careful? (gets into water and pollutes). What must the consumer learn? (Don't be too "picky" in the market; accept produce with blemishes caused by insects and plant diseases. Farmers are often forced to use chemical sprays merely to save the appearance of the products.) How do pesticides affect wildlife, such as birds.

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BAVI

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BAVI

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PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish to format. Please feel free to adapt it and add more pages. Let us know and comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

Each episode used in your class, you may wish to duplicate this suggested free to adapt it and add more pages. Let us know all your critiques live and positive.

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community Activities:

ce & Reference Materials
stions & comments)

ED055918

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 5

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving School in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338

Robert Warp
Robert Kell
George Howl

- C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

MENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

AREA Science GRADE 5

nder Title III E.S.E.A.

C-E

hools in CESA's 3-8-9

Street

Wisconsin 54301

4338

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is re- of over a hundred teachers, year long meetings, a summer workshop, u ecologists, this guide means realistic, developed aid for you. Pleas which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are design- ces--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your stud- to adapt, adopt, or use. By design, the range of suggestions is v- mentation and usage are even wider. Many episodes are self-contai- others can be changed in part or developed more keenly over a few- possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning expe- plan. The reasons are simple. No guide has all the answers and no- unless viewed in the context of your classroom situation. Thus, b- give it a triple reading, check over the resources listed, make m- prime your students, and seek help. The Project personnel and tea- knowledgement page stand ready to aid your efforts. Feel free to a-
4. The Project Resource Materials Center serves all CESA 3, 8, and 9- private. We will send available materials pre-paid. Call for any- visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library f- Center materials. Please offer suggestions, comments, or advice-- service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch id- suggestions on the episode pages or use the attached evaluation f- lected in late May next year and will be used in our revisions. W- reactions and suggestions--negative and positive. Please note tha- in the episodes may refer to specific, local community resources- cases, individual school districts and teachers will have to adop- stitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--survival- Creation's beauty and complexity--often noted as the work of a ge- and human energy to save. A year's work by a hundred of your fell- gesture. Without you, their work will crumble, and so might we al- let us live to think, feel, and act in harmony with our world.

Editori

1. Cognitive means a measurable mental skill, ability, or process
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Accceptable Performance Will Include (labels a cogni
4. EPA - Environmental Problem Area

PREFACE

ite students about their environment, help is ready. Thanks to the efforts
achers, year long meetings, a summer workshop, university consultants and
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Project ICE Bibliography in your school library for available Resource
Please offer suggestions, comments, or advice--at any time--so that this
Let's help each other.

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Editorial Board

is a measurable mental skill, ability, or process based on factual data.
rs to student attitudes, values, and feelings.

ceptable Performance Will Include (labels a cognitive or mental performance.)
mental Problem Area

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 Ronald Hammond, Hortonville
 Jerome Hennes, Little Chute
 Barbara Huth, Menasha
 Darrell Johnson, Hortonville
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 Doris Stehr, Mt. Calvary (L)
 Carolyn Shills, New London
 Sister Dorothy, Xavier
 Clarence Trentlage, Freedom
 Mike Hawkins, Xavier
 Beth Hawkins, Xavier
 Ed Patschke, Menasha
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 Ron Schreier, Omro

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Niagara
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Marinette
rd, Coleman
r, Lena
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en, Suring
Cath. Central
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idge, White Lake
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Lena
Gillett
r, Gillett

CESA #8

Lowell Baltz, Weyauwega
William Behring, Lourdes
David Bell, Neenah
Marie Below, Clintonville
William Bohne, Kimberly
Bob Church, Little Chute
Ronald Conradt, Shiocton
Lee Halberg, Appleton
Ronald Hammond, Hortonville
Jerome Hennes, Little Chute
Barbara Huth, Menasha
Darrell Johnson, Hortonville
Bernadyne King, Neenah
Harold Lindhorst, St. Martin (L)
John Little, Winneconne
Gordon Rohloff, Oshkosh
William Schaff, St. Joseph
Doris Stehr, Mt. Calvary (L)
Carolyn Shills, New London
Sister Dorothy, Xavier
Clarence Trentlage, Freedom
Mike Hawkins, Xavier
Beth Hawkins, Xavier
Ed Patschke, Menasha
Connie Peterson, St. Martin (L)
Dallas Werner, Kaukauna
Ron Schreier, Omro

CESA #9

Joan Alioto, Denmark
Angela Anthony, Gibraltar
Harold Baeten, St. Norbert
Anthony Balistreri, Howard-Suamico
Lillian Berges, Seymour
Carmella Blecha, Green Bay
Joan Charnetski, Sevastopol
Billie Feichtinger, Green Bay
Rev. B. Frigo, Abbot Pennings
Robert Haen, Luxemburg-Casco
Russ Hanseter, Seymour
Paul Kane, Ashwaubenon
Roy Lukes, Gibraltar
Sister Anna, St. Philips
Jim Maki, Sturgeon Bay
Joyce Mateju, Algoma
Richard Minten, W. DePere
Gloria Morgan, Linsmeier Private
George Pederson, Southern Door
Alan Schuh, Pulaski
Thomas Weyers, Cathedral
Ruth Windmuller, Green Bay
James Wiza, DePere
John Torgerson, Kewaunee
Benjamin Roloff, Howard-Suamico
Greg Schmitt, Cathedral
John DeWan, Green Bay
Emmajean Harmann, Sevastopol
Ray Gantenbein, Green Bay
David Bartz, Sturgeon Bay
John Hussey, Green Bay
Sister Barbara, St. Bernard

ff
W-Marinette Ednajeon Purcell, OSU
rds, UW-Marinette David West, Lawrence U.

Robert Cook, UWGB
Dennis Bryan, UWGB

C 1. Energy from the sun, the basic source

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N of all energy, is converted through

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E plant photosynthesis into a form all

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T living things can use for life pro-
cesses.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: The student will construct a drawing showing the riddle of photosynthesis.
Affective: The student will, through verbal action, support the proposition that energy from the sun is converted through photosynthesis into a form all living things can use for life processes.

Skills to be Learned
Experimenting
Observing
Keeping records
Organizing

I. Student-Centered in class activity

1. Pin a geranium leaf between 2 flat corks without removing it from the plant. After 24 hours, this leaf and another leaf that had not been pinned are tested with iodine after removing the chlorophyll. Result: The starch test was negative for the part of the experimental leaf from which light was excluded. Conclusion: Light is necessary for photosynthesis in geranium leaves.

ESEA Title III - 59-70-0135-1 Project I-C-E

the sun, the basic source

is converted through Discipline Area Science
synthesis into a form all Subject Sun Energy
can use for life pro- Problem Orientation Energy Grade 5
cesses.

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Student e thesis. Student al e energy nver- ynthe- l living life	<p>I. Student-Centered in class activity</p> <p>1. Pin a geranium leaf between 2 flat corks without removing it from the plant. After 24 hours, this leaf and another leaf that had not been pinned are tested with iodine after removing the chlorophyll. Result: The starch test was negative for the part of the experimental leaf from which light was excluded. Conclusion: Light is necessary for photosynthesis in geranium leaves.</p>	<p>II. Outside Resource and Community Activities</p>
ed		

Resource and Reference Materials	Continued and Additional Suggested Learning
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p><u>Science In Action</u>, Prentice Hall, Englewood Cliffs, N.J.</p> <p><u>People and Their Environment</u>, Grades 4-5-6, Unit I, p. 5.</p> <p><u>Audio-Visual:</u></p> <p><u>Films:</u></p> <p><u>Our Mr. Sun</u>, 20 min., Bell system.</p> <p><u>Riddle of Photosynthesis</u>, 12 min., U.S. Atomic Energy Commission.</p> <p><u>Community:</u></p>	

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Continued and Additional Suggested Learning Experiences

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C 2. All living organisms interact among
 O
 N themselves and their environment,
 C
 E forming an intricate unit called an
 P
 T ecosystem.

Discipline Area Science
 Subject Interact
 Problem Orientation Imbal

BEHAVIORAL OBJECTIVES

Cognitive: Field trip-
 Collect at least 10 specimens
 (animal aquatic) He will then
 classify & observe. We will
 recognize success if the
 student can successfully
 identify 7 of the 10.
Affective: The student
 support the fact that there
 are interrelationships of
 living things with each other
 and with their physical
 environment.

Skills to be Learned

Classifying
 Measuring
 Collecting
 Observation

SUGGESTED LEARNING EX

- | I. Student-Centered in class activity | II. |
|---|-----|
| A. Encourage children to
make food chains involving
plants and animals other
than those found in water.
B. Let students view slides
of green scum & draw
pictures of what they see. | |

isms interact among

ir environment,

Discipline Area Science

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Interaction of Ecosystem

Problem Orientation Imbalance

Grade 5

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

- A. Encourage children to make food chains involving plants and animals other than those found in water.
- B. Let students view slides of green scum & draw pictures of what they see.

II. Outside Resource and Community Activities

- A. A Collecting trip for the entire class.
 - 1. Organize children into groups.
 - 2. One teacher use groups of two, each of which has its own strainer, pan, & collecting jars.
 - 3. Put each kind of animal (aquatic) in separate book for.
 - a. Young dragonflies (nymph)
 - b. Water boatmen
 - c. Back swimmers
 - d. Water striders
 - e. Adult diving beetles
 - f. Bugs
 - g. The cases of Caddis fly larvae
 - h. Pond snails
 - i. Tadpoles
 - j. Salamanders
 - k. Mites & leeches

Resource and Reference Materials
Publications:

Text:

Exploring Science Series Grade 5
Allyn & Bacon, 1964.

Books:

Adventures with Insects
Richard Headstrom, Lippincott,
1963.

Beginner's Guide to Fresh Water
Life, Leon A. Hausman, Putman,
1950.

Field Book of Ponds & Streams,
Ann Morgan, Putnam, 1950.

Audio-Visual:

Films:

Chain of Life, 11 mins. sound,
color, Pictura Films, 1953.

Life in a Pond (Discovery
Series-II) NET, 1956.

Materials:

Kitchen strainers

Glass jars with screw tops

Pans - Aquarium

Hand Lens

Drinking glass

Needle

Bowl

Cloth or netting

String

Microscope

Alcohol

Small bottles with caps

Community:

Continued and Additional Suggeste

Materials

Continued and Additional Suggested Learning Experiences

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Streams,
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ESEA Title III - 59-70-0135-1 Project I-C-E

C 3. Environmental factors are limiting
 O
 N on the numbers of organisms living
 C
 E within their influence, thus, each
 P
 T environment has a carrying capacity.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Following a field trip, all students will identify 80% of the microscopic plants and animals from a given list devised by the teacher. This will be measured by an objective test.</p> <p><u>Affective:</u> The student will attempt to describe the food chain in a pond and the factors governing the carrying capacity of the pond.</p>	<p>I. Student-Centered in class activity</p>
<p><u>Skills to be Learned</u></p> <p>Collecting Classifying Private research A booklet could be developed organizing and accumulating data.</p>	

Environmental factors are limiting

numbers of organisms living

Discipline Area

Science

their influence, thus, each

Subject

Carrying capacity

ment has a carrying capacity.

Problem Orientation

Carrying

Capacity

Grade 5

BEHAVIORAL OBJECTIVES

Following a
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The student will
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in
class activity

II. Outside Resource and
Community Activities

Ideally this lesson should
include a field trip and
provide experiences in
simple collecting methods.

1. Wade into water knee-
deep or under (wear
tennis shoes).

2. With a water net or
insect net, sweep along
the water surface and
against the water weeds.
Use a kitchen strainer
to scoop up mud and trash
from the bottom. When
the water drains out,
pick up any animals that
are caught and drop them
into white pans for
examination. Students
should look for.....

a) microscopic plants

b) microscopic animals

c) rotifiers, cyclops,
water fleas

d) young fish, tadpoles,
insects, crabs

e) small fish, larger fish

QUESTION:

What would happen if a
farmer dumped some oil
(cont.)

Resource and Reference Materials	Continued and Additional
<p><u>Publications:</u></p> <p><u>Science in Action</u> by Stone Prentice-Hall Books</p> <p><u>Audio-Visual:</u></p> <p>Film - <u>How to Collect Insects</u>; 13 min. - <u>Illinois Natural</u> <u>History Survey</u></p> <p><u>Community:</u></p> <p>Mr. Gary Jolin, Lena Fish and Game Management</p> <p>Mr. Wm. Harper, Biologist, Lena, Wisconsin</p> <p>Mr. G. W. Braun Lena Grade School</p> <p>Lena Environmental Education Ctr. Lena, Wisconsin</p> <p>Local people of similar capacity</p>	<p>II. (cont.)</p> <p>barrels into the pond contained a quantity the carrying capacity</p>

ence Materials

Continued and Additional Suggested Learning Experiences

y Stone

II. (cont.)

barrels into the pond...some of the oil barrels contained a quantity of oil. How would this affect the carrying capacity of the pond? Explain.

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Education Ctr.
lar capacity

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4. An adequate supply of pure water
is essential for life.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: The student will orally discuss the effect of polluted water in living organisms and further explain the condition man is allowing his water resources to become

Affective: After a fish has been placed in polluted water, the student will reject the condition of present drinking water resources.

Skills to be Learned

Observation

Show & Tell Skill

Writing skill

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Bring to class two pure containers of water. One should contain drinkable water in which you have placed a goldfish, tadpole, or some other creature which survives in water; the other should contain water in which bleach or other chemical which will kill the fish once he is placed in it (but will not change the appearance of the water).

Questions:

1. What do I have here?
 2. Does it matter from which container I drink? Why?

3. Who would like to conduct an experiment? Have a student volunteer to transfer the fish from one container to the next. As soon as the fish is placed in the water, it will begin to struggle and die. (cont.)

adequate supply of pure water Discipline Area Science
 tial for life. Subject Water
 Problem Orientation E.P.A. Water Grade 5

ORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
<p>The student will discuss the effect of water in living and further ex- pansion man is on water resources</p> <p>After a fish has been in polluted water student will describe condition of drinking water</p>	<p>I. Student-Centered in class activity</p> <p>1. Bring to class two pure containers of water. One should contain drink- able water in which you have placed a goldfish, tadpole, or some other creature which survives in water; the other should contain water in which bleach or other chemical which will kill the fish once he is placed in it (but will not change the appear- ance of the water).</p> <p>Questions:</p> <p>1. What do I have here?</p> <p>2. Does it matter from which container I drink? Why?</p> <p>3. Who would like to conduct an experiment? Have a student volun- teer to transfer the fish from one container to the next. As soon as the fish is placed in the water, it will begin to struggle and die. (cont.)</p>	<p>II. Outside Resource and Community Activities</p>
<p>What is Learned</p> <p>1 Skill</p> <p>2 Skill</p>		

Resource and Reference Materials	Continued and Additional
<u>Publications:</u> "Be a Pollution Detective" U.S. Dept. of H.E.W. "The Sickening Story of Water Pollution Vs. Dept. of H.E.W." U.S. Dept. of H.E.W. "What's Happening to our Waters?" U.S. Dept. of H.E.W. "America's Shame--Water Pollution" U.S. Dept. of H.E.W. <u>Audio-Visual:</u>	I. cont. They may want to take get the point across. Then ask: 1. What caused the gol 2. Who would like to h 3. Do we put things th 4. What happens when t 5. What happens to the
<u>Community:</u> Gary Jolin Wildlife Game Management Bill Harper Lena Head of environmental action group Local people of the same capacity.	

Materials	Continued and Additional Suggested Learning Experiences
<p>ive"</p> <p>f Water of H.E.W."</p> <p>ur Waters?"</p> <p>r Pollution"</p> <p>ent</p> <p>ental</p> <p>me capacity.</p>	<p>I. cont.</p> <p>They may want to take him out, but this will also get the point across.</p> <p>Then ask:</p> <ol style="list-style-type: none"> 1. What caused the goldfish to die 2. Who would like to have a drink of this water now? 3. Do we put things that are harmful in our water? How? 4. What happens when the toilet is flushed? 5. What happens to the waste from industry?

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4. An adequate supply of pure water
is essential for life.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> The pupil will collect samples of water from as many available sources as possible, and upon the evaporation of the water, the student will verbally state the cause of water pollution.</p> <p><u>Affective:</u> Pupils will suggest how water pollution is sometimes responsible for the shortage of our water resources as it supplies needs for food recreation and life.</p>	<p>I. Student-Centered in class activity</p>
<p><u>Skills to be Learned</u></p> <p>Classifying Measuring Collecting Observing</p>	

te supply of pure water	Discipline Area	Science
for life.	Subject	Water Pollution
	Problem Orientation	E.P.A. Water Grade 5

L OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

- II. Outside Resource and
Community Activities
1. Have students collect
in a jar some water from
different places in your
community (streams, ponds,
puddles and gutters),
shake up the samples and
place a tsp. of each in
a separate dish. Let
the samples evaporate.
Then look at the dishes.
- QUESTIONS:
1. Is their drinking
water safe?
 2. Why do you think so?
 3. Has it been used before?
before?
 4. What has happened to
make it safe?
 5. Why is some water not
fit to use?
 6. What do we mean by
"polluted" water?
2. Ask the Fish and Game
Warden to speak to the
class on the need for
pure water.
 3. Ask fathers and neigh-
bors who work in industry
to speak to the class on
what the company is doing
to cut down on pollution.

Resource and Reference Materials
Publications:

Continued and Additional Su

Teacher's Curriculum Guide to
Conservation Education, National
Wildlife, Feb.-Mar. 1971, pp. 26-28,
43-46.

Audio-Visual:

Wise Use of Water Resources (color)
14 min. V.W.F.

Community:

Local streams, lakes, ponds, rivers,
etc.

Lena Environmental Group
(will send speakers to school)

Materials

Continued and Additional Suggested Learning Experiences

to
tional
pp. 26-28,

s (color)

s, rivers,

hool)

C 5. An adequate supply of clean air is

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N essential because most organisms

Discipline Area Science

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E depend on oxygen, through respiration,

Subject

Earth Science

P

T to release the energy in their food.

Problem Orientation Air Pollution

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
<p><u>Cognitive:</u> The student will demonstrate verbally & through programmed demonstrations that fish, mice & related animals depend on oxygen to obtain energy from their food.</p> <p><u>Affective:</u> By writing letters, the student will demonstrate the conviction that air pollution is dangerous to living organisms.</p>	<p>I. Student-Centered in class activity</p> <p>A. Class activity</p> <ol style="list-style-type: none"> 1. Use demonstration of 2 balloons to show the weight of air. Use a drinking straw over a simple fulcrum as a balance with one empty balloon fastened to either end. When it is balanced, fill one balloon with air & compare the weights. 2. Plant a small plant in each of 2 jars (using as little soil as possible). Seal one jar tightly & keep a growth record of both plants for 2 weeks. 3. Use 2 gold fish, each in a separate small type bowl. Change the water on one daily for fresh oxygen, leave the other goldfish bowl untouched to contaminate itself. Record the results for 2 weeks or long enough to observe results. 4. Use 2 mice, one in an open screen cage, the other in a jar or closed container with simulated smoke or a (cont.) 	<p>II. G</p> <p>Co</p> <p>A.</p>
<p><u>Skills to be Learned</u></p> <p>Developing good hypotheses & testing them for accuracy</p> <p>Making charts & graphs</p> <p>Using a control environment to test an hypothesis</p> <p>Carrying a project through to completion</p> <p>Demonstrating projects of a scientific nature before the class with confidence</p>		

ESEA Title III - 59-70-0135-1 Project I-C-E

supply of clean air is

se most organisms

Discipline Area Science

n, through respiration, Subject

Earth Science

energy in their food.

Problem Orientation Air Pollution Grade 5

OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

Student
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- I. Student-Centered in class activity
- A. Class activity
1. Use demonstration of 2 balloons to show the weight of air. Use a drinking straw over a simple fulcrum as a balance with one empty balloon fastened to either end. When it is balanced, fill one balloon with air & compare the weights.
 2. Plant a small plant in each of 2 jars (using as little soil as possible). Seal one jar tightly & keep a growth record of both plants for 2 weeks.
 3. Use 2 gold fish, each in a separate small type bowl. Change the water on one daily for fresh oxygen, leave the other goldfish bowl untouched to contaminate itself. Record the results for 2 weeks or long enough to observe results.
 4. Use 2 mice, one in an open screen cage, the other in a jar or closed container with simulated smoke or a (cont.)

- II. Outside Resource and Community Activities
- A. Outside activity
1. Go on a field trip to a local paper-mill area or industrial plant where the contaminated air comes in contact with trees, grass or shrubs. Make an evaluation.
 2. Draw pictures or posters to demonstrate clean-air practices.
 3. Write letters of objection to offenders of clean air, water or land in your area.
 4. A nature hike.

Resource and Reference Materials

Publications:

Navarra, Zaffaroni, The Young
Scientist, Book 5, Harper & Row,
1971, pp. 300-337.

Monthly Periodicals:

Ranger Dick

National Wildlife

Wisconsin Conservation

World Book Encyclopedia, Vol. #1

Audio-Visual:

Community:

Continued and Additional Suggested

I: (cont.)

contaminated air supply. Closel
general health & behavior. Reco

5. An adequate supply of clean air is
 essential because most organisms depend
 on respiration to supply the oxygen
 needed to release the energy in their
 food.

Discipline Area

Subject

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> The student will be able to write a paragraph on the subject--how a sealed plant lives. The student will pass an objective test with 80% correct. (Test example on reverse side.)</p> <p><u>Affective:</u> Student will show his appreciation of the above concept by explaining the science processes portrayed in the three experiments.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Make an aquarium in a large jar. <ol style="list-style-type: none"> a) Put about 2 inches of clean sand in the jar. b) Slowly add pond water or aquarium water until the jar is half-full. c) Plant the green water plants in the sand and fill the jar to within 5 inches of the top. d) Screw the cap on tightly. Wind plastic-coated adhesive tape around the cap and jar so that air cannot get in or out. Now the plants are sealed in the jar. e) Place the jar where it will get some sunlight, but not very much. Don't let the jar get very hot or very cold. f) Observe the plants from day to day. <ol style="list-style-type: none"> 1. Are they growing or dying? 2. For how long can they stay sealed in? 3. Predict what will happen (cont.)
<p><u>Skills to be Learned</u></p> <p>Research - setting up experiments</p> <p>Giving oral reports</p> <p>Observation</p> <p>Making value judgements.</p>	

the supply of clean air is

because most organisms depend

on to supply the oxygen

lease the energy in their

Discipline Area

Science

Subject

Air Supply

Problem Orientation Clean Air

5th
Grade 6th

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

1. Make an aquarium in a large
jar.

a) Put about 2 inches of
clean sand in the jar.

b) Slowly add pond water or
aquarium water until the jar
is half-full.

c) Plant the green water
plants in the sand and fill
the jar to within 5 inches
of the top.

d) Screw the cap on tightly.
Wind plastic-coated adhesive
tape around the cap and jar
so that air cannot get in
or out. Now the plants are
sealed in the jar.

e) Place the jar where it
will get some sunlight, but
not very much. Don't let
the jar get very hot or
very cold.

f) Observe the plants from
day to day.

1. Are they growing or
dying?

2. For how long can they
stay sealed in?

3. Predict what will happen
(cont.)

II. Outside Resources and
Community Activities

Resource and Reference Materials

Continued and Additional Suggested L

Publications:

"Concepts in Science"

Harcourt, Brace & World, Inc.

"Interaction of Man and The Biosphere"

Rand McNally & Co., Chicago

"Air and Water Pollution"

Permabound Books

Audio-Visual:

"Life in a Cubic Foot of Air"

(11 min.) \$2.25 (color) 4546

B.A.V.I.

6576-6577

"Poisoned Air" (color) \$9.00

1966 Bureau of Audio-Visual

Instruction

1327 University Ave.

P. O. Box 2093

Madison, WI 53701

Community:

I. (cont.)

if some plants are sealed in a light.

4. Predict how long it will take
tion is correct.

5. Test your predictions:

a) Set up glass jar the same w

b) Set up third glass jar th
jar.

c) Predict what will happen.
take?

Behavioral Objectives Continued

SAMPLE TEST:

Test children with following test

A. 1. A carbohydrate is made up of

a. nitrogen

2. The green water plant gets

a. carbon dioxide

3. The green water plant takes

a. gas

4. A green plant can live with

a. animals

5. A fish cannot live without

a. green plants

B. Write a paragraph or two on th

"How a Sealed-in Plant Live

Materials Continued and Additional Suggested Learning Experiences

, Inc.
"Biosphere"
Chicago

"
4546

\$9.00
usual

I. (cont.)

- if some plants are sealed in a jar but are not exposed to light.
4. Predict how long it will take to discover if your prediction is correct.
 5. Test your predictions:
 - a) Set up glass jar the same with just plants.
 - b) Set up third glass jar the same with only a goldfish in jar.
 - c) Predict what will happen. How long do you think it will take?

Behavioral Objectives Continued.....

SAMPLE TEST:

Test children with following test.....

- A. 1. A carbohydrate is made up of carbon hydrogen and
a. nitrogen b. oxygen
2. The green water plant gets its hydrogen from
a. carbon dioxide b. water
3. The green water plant takes its carbon from
a. gas b. a liquid
4. A green plant can live without
a. animals b. oxygen
5. A fish cannot live without
a. green plants b. soil
- B. Write a paragraph or two on this topic:
"How a Sealed-in Plant Lives"

C 6. Natural resources are not equally

O

N distributes over the earth or over

Discipline Area Science

C

E time and greatly affect the geographic

Subject

Population

P

T conditions and quality of life.

Problem Orientation Natural Resource

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPER

Cognitive: Through research with a panel discussion, the students will express orally the effects of natural resources in the form of fuels on our daily lives.
Affective: The students will recommend the use of a certain fuel and defend his choice after adequate research.

I. Student-Centered in class activity

II. Ou

A. Class resource-research activity

Com

A.

1. Show usage of energy sources at present rates and at rates ten years ago.

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p

2. Discuss future needs based upon projections of populations and industrial growth & recommend replacement of present day fuels: coal, gas and oil.

Skills to be Learned

Accumulating data

Discussion of environmental effects of power sources

are not equally
 earth or over Discipline Area Science
 Subject Population related to resource
 ect the geographic Natural
 Problem Orientation Resources Grade 5
 ty of life.

IVES	SUGGESTED LEARNING EXPERIENCES	
Research on, the orally of ves. nts e of fend uate	I. Student-Centered in class activity A. Class resource-research activity 1. Show usage of energy sources at present rates and at rates ten years ago. 2. Discuss future needs based upon projections of populations and industrial growth & recommend replacement of present day fuels: coal, gas and oil.	II. Outside Resource and Community Activities A. Panel discussion with guest speakers from various power companies. Example - Wis. Public Service, Kewaunee and Two Creeks. Discussion will center around various fuel sources versus pollution.
nmental urses		

Resource and Reference Materials	Continued and Additional Suggested L
<p>Resource and Reference Materials</p> <p><u>Publications:</u></p> <p><u>Conservation</u>, American Petroleum Institute, School Programs, 1271 Avenue of the Americas, New York, N.Y. 10020</p> <p><u>Audio-Visual:</u></p> <p><u>Community:</u></p> <p>Electric company representative</p>	<p>Continued and Additional Suggested L</p>

	Continued and Additional Suggested Learning Experiences
<p>ce Materials</p> <p>n Petroleum ograms, mericas, 0</p> <p>esentative</p>	

Factors such as facilitating transportation,
economic conditions, population growth, Discipline Area Science
and increased leisure time have a great Subject Influence
influence on changes in land use and Problem Orientation Environmental
centers of population density.

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> The student will be able to define the ecological problems caused by the use of nuclear energy. The students will list constructive uses of nuclear energy.</p> <p><u>Affective:</u> The student gathers evidence that man can & does control energy & that people are the great determining factor in the use of nuclear energy.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Make a list of constructive uses of nuclear energy: <ol style="list-style-type: none"> a. Atomic clock b. Propulsion of ships & subs c. Change salt water to fresh water d. Tracers to diagnose disease e. Cancer treatment f. Radio isotopes 2. Make a list of destructive uses of nuclear energy: <ol style="list-style-type: none"> a. Hydrogen bomb b. War heads for missiles c. Etc. 3. List problems: <ol style="list-style-type: none"> a. Control of weapons b. Radiation c. Atomic waste 4. Ask pupils to volunteer for individual reports to share with classmates. <ol style="list-style-type: none"> a. Use of Atom in WW II. b. Nuclear energy in military defense. c. Savannah (cont.)
<p><u>Skills to be Learned</u></p> <p>Organizing reports Giving oral reports Observation Judgement values</p>	

uch as facilitating transportation,

ditions, population growth, Discipline Area Science

d leisure time have a great Subject

Influences for change

changes in land use and
population density.

Problem Orientation Energy Grade 5

LEARNING OBJECTIVES

The student
to define the
problems caused
by nuclear
energy. Students will
list five uses of
nuclear energy.
The student
will state that man
controls energy
and are the
controlling factor
in nuclear

Learned
reports
reports

ues

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Classroom

1. Make a list of con-
structive uses of nuclear
energy:

- a. Atomic clock
- b. Propulsion of ships &
subs
- c. Change salt water to
fresh water
- d. Tracers to diagnose
disease
- e. Cancer treatment
- f. Radio isotopes

2. Make a list of des-
tructive uses of nuclear
energy:

- a. Hydrogen bomb
- b. War heads for missiles
- c. Etc.

3. List problems:

- a. Control of weapons
- b. Radiation
- c. Atomic waste

4. Ask pupils to volunteer
for individual reports to
share with classmates.

- a. Use of Atom in WW II.
- b. Nuclear energy in
military defense.
- c. Savannah (cont.)

II. Outside Resource and
Community Activities

Resource and Reference Materials
Publications:

People & Their Environment,
Tchrs. Curriculum Guide to
Conservation Ed., Gr. 4-5-6,
pp. 70-72.

Audio-Visual:

Our Friend the Atom
Radiated seed ordered from Oak
Ridge Atom Industries, Oak
Ridge, Tennessee.

Community:

U.S. Soil Conservation agent to
speak on Nuclear Science in
the conservation program
Field trip to Two Creeks Nuclear
Energy Plant

Continued and Additional Suggested

I. (cont.)

- d. Nautilus (submarine)
 - e. Desalination plant
 - f. Nuclear energy used in medicine
 - g. The radioisotope in science
 - h. The radioisotope in industry
 - i. Value of Atomic clock
 - j. The radioisotope in agriculture
 - k. Nuclear energy used in space
5. Form a panel for discussion of
for recognizing & solving problems
discovery & progress.
- a. Who should control use of nuclear energy
exist in the world?
 - b. Why does radiation present problems?
 - c. What is done with atomic waste?
 - d. Plant radiation treated to produce
seeds in containers in class
plants the same. Observe differences
plants help the food supply?
6. Prepare a current events bulletin board
newspaper & magazine articles
coal, uranium, oil & gas, along with
from the class members as to
item as man looks into the future
for keeping his machines moving
compete with coal?

Materials	Continued and Additional Suggested Learning Experiences
<p>nt, to -5-6,</p> <p>om Oak Oak</p> <p>gent to e in m</p> <p>Nuclear</p>	<p>I. (cont.)</p> <ul style="list-style-type: none"> d. Nautilus. (submarine) e. Desalination plant f. Nuclear energy used in medicine g. The radioisotope in science research h. The radioisotope in industrial use i. Value of Atomic clock j. The radioisotope in agriculture k. Nuclear energy used in space explorations <p>5. Form a panel for discussion of man's responsibility for recognizing & solving problems which develop with discovery & progress.</p> <ul style="list-style-type: none"> a. Who should control use of weapons? How? Why do they exist in the world? b. Why does radiation present a problem? c. What is done with atomic waste? d. Plant radiation treated tomato and/or marigold seeds in containers in classroom. Care for all plants the same. Observe differences. How can larger plants help the food supply? <p>6. Prepare a current events bulletin board showing newspaper & magazine articles about nuclear energy, coal, uranium, oil & gas, along with commentaries from the class members as to the significance of each item as man looks into the future to make provisions for keeping his machines moving. Will nuclear energy compete with coal?</p>

C 7. Factors such as facilitating transportation,
 O
 N economic conditions, population growth, Discipline Area Scien
 C
 E and increased leisure time have a great Subject Earth
 P En
 T influence on changes in land use and Problem Orientation De
 centers of population density.

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> The student will show awareness of the increased population & how its advancement has caused many new problems by listing at least 3 good alternatives for control of noise, garbage, water & air pollution in verbal, project or written evaluation.</p> <p><u>Affective:</u> The student will demonstrate concern for environmental quality by indicating in discussion their own commitment to personally avoid doing those things which cause deterioration to the environment.</p>	<p>I. Student-Centered in class activity</p> <p>A. Class discussions</p> <ol style="list-style-type: none"> 1. How has life changed in your lifetime? (Moon travel, etc.) 2. How did life change in parents or grandparents time? 3. How do you think life will change in the next 100 years? 4. What have been some noticeable good changes in the past 100 years? 5. What have been some bad changes in the past 100 years? 6. What would be the most important changes we should work or concentrate on now? <p>B. Projects and Ideas</p> <ol style="list-style-type: none"> 1. Make reports on how life has changed. 2. Make a wall mural of land abuses compared with previous original conditions in the past years.
<p><u>Skills to be Learned</u></p> <p>Scientific investigation</p> <p>Personal awareness of problems</p> <p>Comparing data from more than one source</p> <p>Artistic & dramatic type skills</p> <p>Expression of self, verbally-in-writer work & the senses</p> <p>Writing a good hypothesis</p> <p>Using simple scientific equipment</p>	

such as facilitating transportation,

conditions, population growth, Discipline Area Science

ed leisure time have a great Subject

Earth Science

n changes in land use and
population density.

Problem Orientation Deterioration Grade 5

AL OBJECTIVES

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ives for control
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environment.

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Investigation
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k & the senses
od hypothesis
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Class discussions

1. How has life changed in your lifetime? (Moon, travel, etc.)
2. How did life change in parents or grandparents time?
3. How do you think life will change in the next 100 years?
4. What have been some noticeable good changes in the past 100 years?
5. What have been some bad changes in the past 100 years?
6. What would be the most important changes we should work or concentrate on now?

B. Projects and Ideas

1. Make reports on how life has changed.
2. Make a wall mural of land abuses compared with previous original conditions in the past years.

II. Outside Resource and Community Activities

A. Outside projects

1. Have speaker from paper mill or other industry come to class & tell what they are doing to change & control pollution.
2. Have policemen come into class and talk on traffic control.
3. Have recreation director speak on changes in outdoor recreation.

Resource and Reference Materials

Continued and Additional Suggested

Publications:

World Book Encyclopedia

Navarra, Zaffaroni, The Young Scientist, Book 5, Harper & Row, 1971, pp. 338-371, 134-164.

Audio-Visual:

Films:

The Litterbug, color, 8 min., Association Films, (free loan), LaGrange, Illinois 60525.

Natures Way, (The Inland Pond), 14 min. color film (free), Richardson Wildlife Sanctuary, Chesterton, Indiana.

Community:

Materials	Continued and Additional Suggested Learning Experiences
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C 8. Cultural, economic, social, and
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 N political factors determine status
 C
 E of man's values and attitudes
 P
 T toward his environment.

Discipline Area Sci
 Subject Pro
 Problem Orientation Con

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING E

Cognitive: After survey and reading, the students will discuss the economic and social drives that cause many environmental changes.
Affective: The students will offer evidence that man is the determining factor in the control of his environment.

Skills to be Learned
 Observation
 Drawing conclusions

- | I. Student-Centered in class activity | II. |
|---|-----|
| 1. Students & teacher have discussion A.T.V. (all terrain vehicles - cycles, mini-bikes, motorcycles, etc.) their popularity & use. | |
| 2. Through library research, local papers, and conservation magazines, students learn if these ATV's have caused any great damage. | |
| 3. View film on bike climbing Discuss. (check local library or motor vehicle dept.) | |
| 4. Discuss: | |
| a. why so many ATV's | |
| 1) economic abundance | |
| 2) leisure time | |
| b. Man must become aware of his potential damaging power as controller of his environment. | |

ESEA Title III - 59-70-0135-1 Project I-C-E

economic, social, and

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Discipline Area Science

Subject Protection of Land

Problem Orientation Conservation Grade 5

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Students & teacher have discussion A.T.V. (all terrain vehicles - cycles, mini-bikes, motorcycles, etc.) their popularity & use.
 2. Through library research, local papers, and conservation magazines, students learn if these ATV's have caused any great damage.
 3. View film on bike climbing Discuss. (check local library or motor vehicle dept.)
 4. Discuss:
 - a. why so many ATV's
 - 1) economic abundance
 - 2) leisure time
 - b. Man must become aware of his potential damaging power as controller of his environment.

- II. Outside Resource and Community Activities
1. Class trip to local area where these ATV's are used to investigate what damage has been done:
 - a. grass ruined
 - b. soil erosion
 - c. affects of mass erosion

Resource and Reference Materials
Publications:

Magazines:

Conservation

Sports Illustrated

Ranger Rick

National Wildlife

Continued and Additional Sup

Audio-Visual:

Films:

Sport Wheeling in the Sierras,

Harley-Davidson Motor Co.,

3700 W. Juneau Ave, Milw.

11 min., color.

Satan's Choice, 28 min., color,

Consulate General of Canada

310 S. Michigan Ave.

Chicago

Community:

local park owner

aterials

Continued and Additional Suggested Learning Experiences

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color,

nada

C-9. Man has the ability to manage,

O

N manipulate, and change his

C

E environment.

P

T

Discipline Area Science

Subject

Manipulation

Soil

Problem Orientation Conservation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

Cognitive: The students will, to the satisfaction of the teacher, describe in writing the relationship of the size of the soil particles to the soils ability to hold water.
Affective: The student qualifies his hypothesis of soil composition & how this relates to the productivity of soil.

Skills to be Learned

Organization
Evaluation of data
Gathering information
Making graphs & diagrams

I. Student-Centered in class activity

A. Classroom project

1. Examine soil samples under the microscope or lenses.
2. Experiment to determine the amount of water that soil will absorb in a given amount of time. (Use lamp chimneys or glass cylinders & fill with equal amounts of different soil.)
Pour measured amounts of water through the soil. Record results in a table or graph.
3. Experiment with the same soil samples to find the amount of organic matter in them. Place a small quantity of each sample into a container of water. Allow it to settle. The floating material is mainly organic. Heat each sample to burn the organic material.
4. Compare the results of the experiments to see if there is any relationship between the amount of organic material & the ability of the soil to hold water. Better crops come from soil (co

ESEA Title III - 59-70-0135-1 Project I-C-E

ility to manage,

change his

Discipline Area Science

Subject

Manipulation

Soil

Problem Orientation Conservation Grade 5

OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

Students
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I. Student-Centered in class
activity

A. Classroom project

1. Examine soil samples
under the microscope or
lenses.
2. Experiment to determine
the amount of water that
soil will absorb in a
given amount of time. (Use
lamp chimneys or glass
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amounts of different soil.)
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water through the soil. Record
results in a table or graph.
3. Experiment with the same soil
samples to find the amount of
organic matter in them. Place
a small quantity of each sample
into a container of water. Allow
it to settle. The floating
material is mainly organic. Heat
each sample to burn the organic
material.
4. Compare the results of the
experiments to see if there is
any relationship between the
amount of organic material & the
ability of the soil to hold water.
Better crops come from soil (cont.)

II. Outside Resource
and Community
Activities

ed

a
tion
diagrams

Resource and Reference Materials
Publications:

Books:

Biological Science, Patterns & Processes, Holt, Rinehart & Winston, New York.

The Balance of Nature by Milne, Alfred A. Knopf, New York, 1960.

Soil Use & Improvement, Prentice Hall, Englewood Cliff, New Jersey, 1957.

Man and the Good Earth, Ellis & Amabel, G. P. Putnam's Sons, New York, 1959.

Audio-Visual:

Films:

1289 Living Earth, Color, EBF, 1949, BAVI.

6889 Man Uses & Changes The Land Color, Coronet, 1967, BAVI.

Materials used:

Samples of soil

Metal dish

Glass cylinders

Heat source

Community:

Continued and Additional Suggeste-

I. (cont.)

that is cared for properly, to people.

Materials	Continued and Additional Suggested Learning Experiences
<p>Patterns & Chart 2</p> <p>by Milne, York, 1960. , Prentice , New</p> <p>, Ellis & s Sons,</p> <p>or, EBF,</p> <p>s The Land, BAVI.</p>	<p>I. (cont.) that is cared for properly, to the benefit of all people.</p>

C 10. Short-term economic gains may
 O
 N produce long-term environmental
 C
 E losses.
 P
 T

Discipline Area Science

Subject Science

Problem Orientation Conservation

Project I-C-E
 ESEA Title III - 59-70-0135-1

BEHAVIORAL OBJECTIVES

Cognitive: All students will use the identification key to identify at least 3 pictures from the picture set. After identification, each student will describe in writing, one use of the 3 trees identified.
Affective: The student will seek to identify the various trees.

Skills to be Learned
 Collecting information
 Problem solving
 Development of environmental values

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 - A. Classroom
 1. Show film, Forest & Conservation. Briefly summarize the film in discussion. Have the students read Woodlawns of Wisconsin & Trees for Tomorrow from the Exploring Wisconsin Text.
 2. Set up one film viewing station & 4 or 5 filmstrip viewing stations for the visual materials listed.
 3. After completing the above procedure, students will begin the identification procedure as stated in the objectives.
 4. Concept - All resources are vulnerable to depletion in quantity, quality or both. Example - Forest provides a wide variety of products but measures must be taken to prevent their being exhausted.

term economic gains may

term environmental

Discipline Area Science

Subject Science

Problem Orientation Conservation Grade 5

AL OBJECTIVES

All students
identification
at least
from the picture
identification,
will describe
use of the
ified.
the student
identify
rees.

Learned
information
ing
of environmental

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Classroom

1. Show film, Forest & Conservation. Briefly summarize the film in discussion. Have the students read Woodlawns of Wisconsin & Trees for Tomorrow from the Exploring Wisconsin Text.
2. Set up one film viewing station & 4 or 5 filmstrip viewing stations for the visual materials listed.
3. After completing the above procedure, students will begin the identification procedure as stated in the objectives.
4. Concept - All resources are vulnerable to depletion in quantity, quality or both. Example - Forest provides a wide variety of products but measures must be taken to prevent their being exhausted.

II. Outside Resource and
Community Activities

Resource and Reference Materials
Publications:

Text - Exploring Wis.
Follett Pub. Co., 1967

Audio-Visual:

Films: EAVI

F 4511 Forests & Conservation

F 4502 Conserving Our Forests
Today

Filmstrips:

4921 Trees

4503 Forest Resources

Series-Golden Nature-Guide-

American Trees

4830 - Part 1 Trees

4831 - Part 2 Trees

4832 - Part 3 Trees

4833 - Part 4 Trees

Community:

Continued and Additional

ice Materials

Continued and Additional Suggested Learning Experiences

67

nservation
ur Forests

es
-Guide-

C 12. Private ownership must be re-

O

N garded as a stewardship and should

C

E not encroach upon or violate

P

T the individual right of others.

Discipline Area Science

Subject

Science

Water

Problem Orientation Conservation

BEHAVIORAL OBJECTIVES

Cognitive: The student will describe orally the need for a careful stewardship of the water available at the present time.

Affective: The student will criticize the problems that private ownership brings to his community.

Skills to be Learned

Collecting information

Making value judgments

Problem solving

Making graphs and charts to aid in presenting their facts and figures

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. As populations increase, competition for the use of water increases, resulting in a need for establishing water use priorities.

B. Role-playing - One group of children represent a group of environmental scientists; the other, a group of farmers.

1. the problem: the farmers are pumping from the river to irrigate their fields. The result is a lowering of the river so that many other activities can no longer be carried on.

2. Children collect all facts and figures. A third group will act as a board and make a decision regarding use of water.

3. There are many boards in the city so use several.

4. Use groups of children from city, country, and suburbs.

II.

Project I-C-E

ESEA Title III - 59-70-0135-1

ownership must be re-

stewardship and should

Discipline Area Science

h upon or violate

Subject Science

Water

ual right of others.

Problem Orientation Conservation Grade 5

GENERAL OBJECTIVES

The student will
ally the need for
ewardship of
ailable at the
he student will
e problems that
rship brings to
y.

Learned
information
e judgments
ving
hs and charts
presenting
s and figures

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. As populations increase,
competition for the use
of water increases, re-
sulting in a need for es-
tablishing water use
priorities.

B. Role-playing - One group
of children represent a
group of environmental
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1. the problem: the
farmers are pumping from
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2. Children collect all
facts and figures. A third
group will act as a board
and make a decision
regarding use of water.

3. There are many boards in
the city so use several.

4. Use groups of children
from city, country, and
suburbs.

II. Outside Resource and
Community Activities

Resource and Reference Materials
Publications:

Continued and Additional

Environmental Education Concepts &
Teaching Materials, Cook, Gr. 4-6
Interaction of Man & the Biosphere,
Rand McNally & Co., Chicago

Audio-Visual:

Films:

5367 Conserving Our Wildlife Today,
Color, Coronet, 1962, BAVI
1974 Man's Problem, Part II Living
Water Series, Color, 19 min. EBF,
1953, BAVI

Community:

Contact Mr. Gary Jolin, Lena, Wis.
Mr. Jolin has much knowlege of the
rivers, streams & lakes of Oconto
Co.
Contact DNR to send out a resource
person

Source Materials	Continued and Additional Suggested Learning Experiences
<p> ion Concepts & Cook, Gr. 4-6 the Biosphere, Chicago </p>	
<p> Wildlife Today, 62, BAVI Part II Living r, 19 min. EBF, </p>	
<p> in, Lena, Wis. knowlege of the akes of Oconto out a resource </p>	

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish to format. Please feel free to adapt it and add more pages. Let us know comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

each episode used in your class, you may wish to duplicate this suggested
free to adapt it and add more pages. Let us know all your critiques and
and positive.

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ning Experiences

ommunity Activities:

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estions & comments)

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

ED055918

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 6

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1827 Main Street
Green Bay, Wisconsin 54301
(414) 432-4332

Robert Warpi
Robert Kelln
George Howle

PROGRAM FOR ENVIRONMENTAL EDUCATIONScience GRADE 6

Title III E.S.E.A.

in CESA's 3-8-9

nsin 54301

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is ready. Of over a hundred teachers, year long meetings, a summer workshop, university ecologists, this guide means realistic, developed aid for you. Please note which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are designed--a ces--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your students to adapt, adopt, or use. By design, the range of suggestions is wide; mentation and usage are even wider. Many episodes are self-contained, others can be changed in part or developed more keenly over a few weeks possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning experience plan. The reasons are simple. No guide has all the answers and no curriculum unless viewed in the context of your classroom situation. Thus, before give it a triple reading, check over the resources listed, make mental prime your students, and seek help. The Project personnel and teachers knowledge page stand ready to aid your efforts. Feel free to ask them.
4. The Project Resource Materials Center serves all CESA 3, 8, and 9 areas private. We will send available materials pre-paid. Call for any help, visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library for available Center materials. Please offer suggestions, comments, or advice--at any service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch ideas, suggestions on the episode pages or use the attached evaluation format lected in late May next year and will be used in our revisions. We solicit reactions and suggestions--negative and positive. Please note that some in the episodes may refer to specific, local community resources or cases, individual school districts and teachers will have to adopt local substitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--survival--your Creation's beauty and complexity--often noted as the work of a genius--and human energy to save. A year's work by a hundred of your fellow teachers gesture. Without you, their work will crumble, and so might we all--let us live to think, feel, and act in harmony with our world.

Editorial Board

1. Cognitive means a measurable mental skill, ability, or process based
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels a cognitive
4. EPA - Environmental Problem Area

PREFACE

te students about their environment, help is ready. Thanks to the efforts
chers, year long meetings, a summer workshop, university consultants and
e means realistic, developed aid for you. Please note the following ideas
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he context of your classroom situation. Thus, before trying an episode,
eading, check over the resources listed, make mental and actual notes,
s, and seek help. The Project personnel and teachers listed on the ack-
stand ready to aid your efforts. Feel free to ask their help in pre-planning.
ce Materials Center serves all CESA 3, 8, and 9 area schools--public and
end available materials pre-paid. Call for any help, materials, or to
338.

oject ICE Bibliography in your school library for available Resource
Please offer suggestions, comments, or advice--at any time--so that this
Let's help each other.

ith the guide by reacting to it with scratch ideas, notes, and extended
episode pages or use the attached evaluation format, which will be col-
next year and will be used in our revisions. We sincerely want your
estions--negative and positive. Please note that some resources listed
y refer to specific, local community resources or conditions. In such
school districts and teachers will have to adopt local or available sub-
f terms pertinent to the episodes is below.

er experts have simplified the issue--survival--yours, mine, our students,
and complexity--often noted as the work of a genius--will take our genius
o save. A year's work by a hundred of your fellow teachers is a saving
ou, their work will crumble, and so might we all--literally. Instead,
nk, feel, and act in harmony with our world.

Editorial Board

a measurable mental skill, ability, or process based on factual data.
s to student attitudes, values, and feelings.

ptable Performance Will Include (labels a cognitive or mental performance.)
ntal Problem Area

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CESA #3

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lin, Goodman	John Little, Winneconne	Jim Maki, Sturgeon Bay
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o, Niagara	William Schaff, St. Joseph	Richard Minten, W. DePere
er, Gillett	Doris Stehr, Mt. Calvary (L)	Gloria Morgan, Linsmeier Private
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n, Lena	Beth Hawkins, Xavier	James Wiza, DePere
, Gillett	Ed Patschke, Menasha	John Torgerson, Kewaunee
er, Gillett	Connie Peterson, St.Martin (L)	Benjamin Roloff, Howard-Suamico
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		John Hussey, Green Bay
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C 1. Energy from the sun, the basic source
 O
 N of all energy, is converted through plant
 C
 E photosynthesis into a form all living
 P
 T things can use for life processes.

Discipline Area

Subject

Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Through experimentation and recorded daily observations, it will be shown that life is dependent upon energy from the sun.
Affective: Student investigates how life is dependent on the sun.

Skills to be Learned

Experimentation
 Observation
 Recording
 Concluding

- I. Student-Centered in class activity
1. Prepare four test tubes:
 - a) Two, each with water, a snail, and a piece of water plant. These are stoppered and sealed so that no air can get in.
 - b) Two, each with water, a snail, and a piece of water plant; these two are not stoppered but left open to the air.
 - c) One, each, of the stoppered and open test tubes will be covered so they have no access to light. The other stoppered and open tubes will be placed where they will receive light in a normal way.
 2. Each day the four test tubes will be placed side by side for a short time to allow students to observe and record any changes.
 3. It will be shown that light (sun) is required for life.

(cont.)

From the sun, the basic source
is converted through plant
into a form all living
for life processes.

Discipline Area Science
Subject Plants
Problem Orientation Energy Grade 6

I. OBJECTIVES

High experi-
enced
ns, it will
life is depen-
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life is de-
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urned

SUGGESTED LEARNING EXPERIENCES

**I. Student-Centered in
class activity**

1. Prepare four test tubes:
 - a) Two, each with water, a snail, and a piece of water plant. These are stoppered and sealed so that no air can get in.
 - b) Two, each with water, a snail, and a piece of water plant; these two are not stoppered but left open to the air.
 - c) One, each, of the stoppered and open test tubes will be covered so they have no access to light. The other stoppered and open tubes will be placed where they will receive light in a normal way.
2. Each day the four test tubes will be placed side by side for a short time to allow students to observe and record any changes.
3. It will be shown that light (sun) is required for life.

(cont.)

**II. Outside Resource and
Community Activities**

Resource and Reference Materials

Publications:

Any text, etc. that deals with photosynthesis.

Audio-Visual:

Movie:

"Riddle of Photosynthesis" (14 min.)

U.S. Atomic Energy Commission

9800 S. Cass Ave.

Argonne, Ill. 60439

Filmstrips on photosynthesis

Transparencies

Charts

Community:

Lake, pond, and streams show evidence of the same thing on a large scale

Continued and Additional Suggest

I. Cont.)

a) Lack of oxygen in the sea snail.

b) Food supply was exhausted sealed.

Materials	Continued and Additional Suggested Learning Experiences
<p>ls with</p> <p>is" (14 min.) mission</p> <p>thesis</p> <p>show hing</p>	<p>I. Cont.)</p> <p>a) Lack of oxygen in the sealed, dark tube killed the snail.</p> <p>b) Food supply was exhausted in the dark tube that was sealed.</p>

C All living organisms interact among
 O
 N themselves and their environment,
 C
 E forming an intricate unit called an
 P
 T ecosystem. #2

Discipline Area SCI

Subject EAP

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> The student will be able to observe plant growth in different types of soil as demonstrated by his obtaining five different types and growing the same species of plant under controlled conditions in each type of soil.</p> <p><u>Affective:</u> Using five different types of soil, students will plant a certain species, such as Lima bean, & controlling light, water & temperature*</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Using area map discuss possible sites for collecting soil (to obtain wide variety). 2. Invite county soil agent to discuss soil types & how to locate them. 3. Develop a plan as to how controlled experiment will be carried out. 4. Actual work of preparing containers, planting seeds or plants -- daily tasks to be carried out as plants begin to grow.
<p><u>Skills to be learned</u></p> <p>Differentiating between & collecting the soils, planting seeds & controlling light, water, & temp., observing plant growth, measuring it & recording data, comparing growth, attach values to various soils.</p>	
<p>* The student proposes that soil has an effect on growth.</p>	

ving organisms interact among

lves and their environment,

g an intricate unit called an

tem. #2

Discipline Area SCIENCE

Subject EARTH SCIENCE

Problem Orientation ECOSYSTEM Grade SIX

BEHAVIORAL OBJECTIVES

e: The student
able to observe
rowth in different
soil as demon-
by his obtaining
ferent types and
the same species
under controlled
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e: Using five
types of soil,
will plant a
species, such as
, & controlling
water & temperature*

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Using area map discuss possible sites for collecting soil (to obtain wide variety).
2. Invite county soil agent to discuss soil types & how to locate them.
3. Develop a plan as to how controlled experiment will be carried out.
4. Actual work of preparing containers, planting seeds or plants -- daily tasks to be carried out as plants begin to grow.

II. Outside Resource and Community Activities

A. Library

1. Locate information about the major soil groups of your area.
2. Get ideas from books, such as "Living Earth" by Farb.

B. Out of School

1. Collect as many different types of soil in your home area as you can. Compare. Why are they there? Test them. Compare plant-growing potential.

Resource and Reference Materials

Publications:

Books:

SOIL, 1957 yearbook of agriculture
MAN AND THE GOOD EARTH by Williams
Ellis. G.P. Putman Sons. 1958.
LIVING EARTH by Peter Farb, pub.
by Harper (Excellent).

Conservation Foundation, 1250
Conn. Ave., N.W., Washington,
D.C. 20036.

Audio-Visual:

Films:

UNDERSTANDING OUR EARTH, SOIL.
LIFE IN A CUBIC FOOT OF SOIL.
MAKING THE MOST OF A MIRACLE.

All are available from BAVI.

Community:

County or district soil expert.

Continued and Additional Suggest

Materials Continued and Additional Suggested Learning Experiences

Agriculture
Williams
1958.
, pub.

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C 2. All living organisms interact
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N among themselves and their environ-
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E ment, forming an intricate unit
P
T called an ecosystem.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: Student will establish a population of grass, clover and other plants in a terrarium enabling him to make observations and measurements.

Affective: The student, through the construction of a terrarium, will defend the assumption that all living organisms interact among themselves for survival.

Skills to be Learned

Arrange materials, plant and water seeds. Care for all materials.

Develop ways of studying plants, their rate of growth, manner of growth, effects on each other.

SUGGESTED LEARNING

I. Student-Centered in class activity

1. Initiative should be stressed in that each two students will establish terrarium using various types of containers. (Gallon jars work well--even 2 qt. jars will do). Students may add seeds in addition to grass and clover seeds supplied.

2. Establish with class:

- a) care of terraria, watering, etc.
- b) observation of terraria; sharing observations.
- c) identifying plants as they sprout and develop--parts of plants.
- d) Some will be able to measure rate of growth and even determine why some grow at different rates. Make graphs to indicate number of plants and rate of growth.

II.

organisms interact

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n intricate unit

stem.

Discipline Area

Science

Subject

Plants - 2

Problem Orientation E.P.A. Ecosystem Grade 6

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
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 - b) observation of terraria; sharing observations.
 - c) identifying plants as they sprout and develop--parts of plants.
 - d) Some will be able to measure rate of growth and even determine why some grow at different rates. Make graphs to indicate number of plants and rate of growth.

- II. Outside Resource and Community Activities
 1. Various ways of setting up terraria can be found in references.
 2. Students can be encouraged to start their own terraria at home and to use their imagination and ingenuity in trying different things.
 - a) vary types of plants to grow and observe
 - b) using same types of seeds and several small terraria, vary numbers of seeds in each and observe their growth.

Resource and Reference Materials

Publications:

Seed catalogs
Leaflet on establishing terraria,
National Audubon Society
National Wildlife
Ranger Rick Magazines
Encyclopedias

Audio-Visual:

Community:

Continued and Additional Sugg

Materials	Continued and Additional Suggested Learning Experiences
g terraria, ety	

C 3. Environmental factors are limiting
 O
 N on the numbers of organisms living within Discipline Area
 C
 E their influence, thus, each environment Subject
 P
 T has a carrying capacity. Problem Orientation

BEHAVIORAL OBJECTIVES

Cognitive: The student will be able to observe and control an increase in duckweed population in simple aquarium. APWI designing the physical aquarium, controlling constants and variables to the degree at which the student will observe how the over-abundance of a population will change the entire ecosystem.
Affective: The student will investigate the effect of an over-population on an ecosystem and suggest further examples where this overloading may occur.

Skills to be Learned

Planning ways to vary rate of reproduction
 Making daily observations counts, attaching values to types of water and materials added to water.

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. Discuss the nature of duckweed and how it reproduces.
 2. Establish ways of keeping population stable, decreasing it and increasing it.
 - a) vary light
 - b) vary water temperature
 - c) add substance such as sugar, fertilizer, detrius.
 3. Develop ways of observing, counting and testing results.
 4. Student time - Only a small amount of time will be needed each day to continue project to its completion in two to three weeks. Aquarium can be simple; small jars or Petri dishes. Nearly any quiet pond contains duckweed.
 5. Lead students to establish their objective in written form. For example:
 - a) how you will attempt to increase, decrease, or stabilize duckweed popula-

(Con

1. factors are limiting

of organisms living within

e, thus, each environment

capacity.

Discipline Area

Science

Subject

Plants

Problem Orientation

Carrying
Capacity

Grade 6

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Discuss the nature of duckweed and how it reproduces.
2. Establish ways of keeping population stable, decreasing it and increasing it.
 - a) vary light
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5. Lead students to establish their objective in written form. For example:
 - a) how you will attempt to increase, decrease, or stabilize duckweed popula-

II. Outside Resources and Community Activities

(Cont.)

Resource and Reference Materials

Publications:

"Manual of Aquatic Plants of the Midwest", Norman Fassett - Univ. of Wisc. Press

Golden Nature Series, by Zim
"Pond Life"

Use various references to learn more about duckweed (*Lemna minor* and perhaps other species.)

Audio-Visual:

Community:

Visit sanctuary or swamp with duckweed growth to see it in natural state along with varied conditions.

Continued and Additional Suggestions

I. (cont.)

tion

b) how you will test your p

c) recording your data

d) final evaluations - what

e) applications - how might other plants, good and bad.

Materials	Continued and Additional Suggested Learning Experiences
of the - Univ. m learn more or and	I. (cont.) tion b) how you will test your procedures c) recording your data d) final evaluations - what effects of controls were.... e) applications - how might this principle apply to other plants, good and bad.
h duck- natural nditions.	(This section contains faint, illegible text, likely bleed-through from the reverse side of the page.)

C
O
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P
T

4. An adequate supply of pure water
is essential for life.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: Using at least five different qualities of water, the student will set up simple aquariums containing the same species of animal (daphnia, goldfish, snail, etc.) gravel, water, plant and observe what effect the water will have on the living animals and plants and by completing a diagram show how water quality affects plant and animal life.
Affective: The student will praise or criticize the water quality of his area, thereby showing the need for pure water.

Skills to be Learned

Differentiating between and collecting the quantities of water; controlling amount of food fed to animals.

Observing, comparing and recording behavior of animals and growth of plants, and attaching values to various waters.

SUGGESTED LEARNING ACTIVITIES

- I. Student-Centered in class activity
 1. Determine where various qualities of water can be collected. Attempt to have variety ranging from pure to very polluted.
 2. Develop plans as to how controlled experiment will be carried out.
 3. Prepare containers (a qt. fruit jar for example), put in gravel, plants, water and animal(s). Daily tasks to be carried out including feeding, observing and recording data.

ESEA Title III - 59-70-0135-1 Project I-C-E

An adequate supply of pure water
essential for life.

Discipline Area Science
Subject Animals

Problem Orientation E.P.A. Water Grade 6

BEHAVIORAL OBJECTIVES

ave: Using at least
ifferent qualities of
the student will set
le aquariums contain-
e same species of
(daphnia, goldfish,
etc., gravel, water,
and observe what effect
ter will have on the
animals and plants
completing a diagram
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or criticize the water
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to be Learned
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ng values to various

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Determine where various qualities of water can be collected. Attempt to have variety ranging from pure to very polluted.
 2. Develop plans as to how controlled experiment will be carried out.
 3. Prepare containers (a qt. fruit jar for example), put in gravel, plants, water and animal(s). Daily tasks to be carried out including feeding, observing and recording data.

- II. Outside Resource and Community Activities
1. Consult county or city water sanitary personnel for suggestions of collecting sites.
 2. Locate different information about different water pollutants and discover their effects on plant and animal life.
 3. Visit sites of various degrees of water pollution. Observe plant and animal life...make comparisons.

Resource and Reference Materials
Publications:

Continued and Additional Sup

Audio-Visual:

Community:

Department of Natural Resources,
Environmental Control
County Health Department
State Health Department

e Materials	Continued and Additional Suggested Learning Experiences
<p>Resources,</p> <p>t</p>	<p>Continued and Additional Suggested Learning Experiences</p>

C 5. An adequate supply of clean air is
 O
 N essential because most organisms depend
 C
 E on respiration to supply the oxygen
 P
 T needed to release the energy in their food.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: The student will be able to write a paragraph on the subject--how a sealed plant lives. The student will pass an objective test with 80% correct. (Test example on reverse side.)
Affective: Student will show his appreciation of the above concept by explaining the science processes portrayed in the three experiments.

Skills to be Learned

Research - setting up experiments
 Giving oral reports
 Observation
 Making value judgements.

SUGGESTED LEARNING

- I. Student-Centered in class activity
 1. Make an aquarium in a large jar.
 - a) Put about 2 inches of clean sand in the jar.
 - b) Slowly add pond water or aquarium water until the jar is half-full.
 - c) Plant the green water plants in the sand and fill the jar to within 5 inches of the top.
 - d) Screw the cap on tightly. Wind plastic-coated adhesive tape around the cap and jar so that air cannot get in or out. Now the plants are sealed in the jar.
 - e) Place the jar where it will get some sunlight, but not very much. Don't let the jar get very hot or very cold.
 - f) Observe the plants from day to day.
 1. Are they growing or dying?
 2. For how long can they stay sealed in?
 3. Predict what will happen (cont.)

adequate supply of clean air is

because most organisms depend

on photosynthesis to supply the oxygen

and release the energy in their

Discipline Area

Science

Subject

Air Supply

Problem Orientation Clean Air

5th
Grade 6th

LEARNING OBJECTIVES

The student will
write a paragraph
describing--how a sealed
jar works.
The student
will complete an objective test
correct. (Test
on reverse side.)
The student will
demonstrate appreciation of
the science process
used in the three

What was Learned
Setting up

Student reports
on
the judgements.

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

1. Make an aquarium in a large
jar.

a) Put about 2 inches of
clean sand in the jar.

b) Slowly add pond water or
aquarium water until the jar
is half-full.

c) Plant the green water
plants in the sand and fill
the jar to within 5 inches
of the top.

d) Screw the cap on tightly.
Wrap plastic-coated adhesive
tape around the cap and jar
so that air cannot get in
or out. Now the plants are
sealed in the jar.

e) Place the jar where it
will get some sunlight, but
not very much. Don't let
the jar get very hot or
very cold.

f) Observe the plants from
day to day.

1. Are they growing or
dying?

2. For how long can they
stay sealed in?

3. Predict what will happen
(cont.)

II. Outside Resources and
Community Activities

Resource and Reference Materials

Publications:

"Concepts in Science"

Harcourt, Brace & World, Inc.

"Interaction of Man and The Biosphere"

Rand McNally & Co., Chicago

"Air and Water Pollution"

Permabound Books

Audio-Visual:

"Life in a Cubic Foot of Air"

(11 min.) \$2.25 (color) 4546

B.A.V.I.

6576-6577

"Poisoned Air" (color) \$9.00

1966 Bureau of Audio-Visual

Instruction

1327 University Ave.

P. O. Box 2093

Madison, WI 53701

Community:

Continued and Additional Suggested Learning Activities

I. (cont.)

if some plants are sealed in a jar of light.

4. Predict how long it will take to determine if the prediction is correct.

5. Test your predictions:

a) Set up glass jar the same with plants.

b) Set up third glass jar the same with no plants.

c) Predict what will happen. How long will it take?

Behavioral Objectives Continued...

SAMPLE TEST:

Test children with following test...

A. 1. A carbohydrate is made up of carbon and

a. nitrogen b. oxygen

2. The green water plant gets its energy from

a. carbon dioxide b. light

3. The green water plant takes in

a. gas b. water

4. A green plant can live without

a. animals b. light

5. A fish cannot live without

a. green plants b. oxygen

B. Write a paragraph or two on this topic:
"How a Sealed-in Plant Lives"

Continued and Additional Suggested Learning Experiences

I. (cont.)

sphere"

if some plants are sealed in a jar but are not exposed to light.

4. Predict how long it will take to discover if your prediction is correct.

5. Test your predictions:

a) Set up glass jar the same with just plants.

b) Set up third glass jar the same with only a goldfish in jar.

c) Predict what will happen. How long do you think it will take?

Behavioral Objectives Continued.....

SAMPLE TEST:

Test children with following test.....

A. 1. A carbohydrate is made up of carbon hydrogen and

a. nitrogen

b. oxygen

2. The green water plant gets its hydrogen from

a. carbon dioxide

b. water

3. The green water plant takes its carbon from

a. gas

b. a liquid

4. A green plant can live without

a. animals

b. oxygen

5. A fish cannot live without

a. green plants

b. soil

B. Write a paragraph or two on this topic:

"How a Sealed-in Plant Lives"

C 6. Natural resources are not equally

O

N distributed over the earth or over

Discipline Area

C

E time and greatly affect the geographic

Subject

P

T conditions and quality of life.

Problem Orientation

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARN
<p><u>Cognitive:</u> Child will draw a picture of a desert, jungle, polar & temperate climate. Included in this picture will be plants, animals, homes, and land surface of that geographic region.</p> <p><u>Affective:</u> The teacher will have four classifications using pictures of jungle, desert, polar & temperate climate. Each child will choose a pictured animal (sight unseen); he will view his picture & place it in correct classification.</p>	<p>I. Student-Centered in class activity</p> <p>1. Bulletin board "Wildlife"</p> <p><u>Jungle</u> (alligator, crocodile, elephant, zebra, monkey, rhinoceros, lion, etc.)</p> <p><u>Desert</u> (lizard, snake, camel)</p> <p><u>Polar</u> (polar bear, walrus, caribou, seal whale, etc.)</p> <p><u>Temperate</u> (deer, skunk, raccoon, badger, bear, moose, beaver, coyote, etc.)</p> <p>What do people use these animals for? (hunting, commercial nature study, home, labor, etc.)</p> <p>2. Show pictures of homes around the world. Discuss why people make their homes as they do. Why is a home made of adobe in a desert? (mud is available) Why a canvas tent? (movable for nomads with cattle) Why a tree house? (danger of wild animals & flood, trees are plentiful)</p> <p>3. Plants: Show pictures of plants of the desert, giant redwoods, shade trees, bushes & trees & plants that produce food. Discuss how these plants are used by (Cont.)</p>
<p><u>Skills to be Learned</u></p> <p>Bulletin board of wildlife</p> <p>Study of homes around the world</p> <p>Observation of animal homes on a nature walk</p> <p>Dramatization and creative dramatics</p>	

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Discipline Area

Science

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Subject

Science

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Problem Orientation

Natural

Resources

Grade

6

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. Bulletin board "Wildlife"
Jungle (alligator, crocodile, elephant, zebra, monkey, rhinoceros, lion, etc.)
Desert (lizard, snake, camel)
Polar (polar bear, walrus, caribou, seal whale, etc.)
Temperate (deer, skunk, raccoon, badger, bear, moose, beaver, coyote, etc.)
What do people use these animals for? (hunting, commercial nature study, home, labor, etc.)
 2. Show pictures of homes around the world. Discuss why people make their homes as they do. Why is a home made of adobe in a desert? (mud is available) Why a canvas tent? (movable for nomads with cattle) Why a tree house? (danger of wild animals & flood, trees are plentiful)
 3. Plants: Show pictures of plants of the desert, giant redwoods, shade trees, bushes & trees & plants that produce food. Discuss how these plants are used by (Cont.)

- II. Outside Resource and Community Activities
 1. Take walk through nature trail. Look for animal homes. (bird, raccoon, skunk, mice, squirrel, rabbits, etc.)
Draw or paint pictures of animals and their homes which were observed. Or, make clay sculptures, or diorama.

Resource and Reference Materials
Publications:

Audio-Visual:

Filmstrips:

Wambo and Tawa of the Hot Lands
Ahmed and Adah of the Desert Lands
Nannook and Okawa of the Cold Lands
Plants We Know

Films:

Homes Around the World, Coronet,
color, 11 min., BAVI
Animal Habitats, color, FA, 11 min.,
BAVI
Why Plants Grow Where They Do,
color, 11 min., Coronet, BAVI
Dairy Farm, 2nd ed., color, 14 min.,
Coronet, BAVI
New House: Where It Comes From,
B & W, 11 min., Coronet, BAVI
Our Natural Resources, color, 11 min.,
Dowling, BAVI
Our Earth, color, 12 min., Colburn,
BAVI

Community:

Visit house being constructed
Conservation warden
Nature trail
Farm visit

Continued and Additional Suggested

I. (Cont.)

people in that environment. Why
grow anywhere. Why are there few
region.

4. Creative dramatics: Pretend you
pond, a slithering snake catching
eating corn, etc.

5. Diarama: Farm (Show land use
buildings.) What determines a farm
changes, types of soil, rainfall
markets)

6. Diagram: Life of any plant which
and its final products. EX.-potato
harvests it-potato farm sorts and
burlap bags-sold to factories for
products (potato chips, French
fries, etc.)

7. Read story of 3 pigs: Dramatize
built by 3 pigs. Or make models
boxes. Real straw glued on one
bricks or cardboard bricks. Where
pig get the straw? (from a man)
the straw? (grain) Where did soil
come from? (from the earth)
the bricks? (clay, soil, sand)

Materials	Continued and Additional Suggested Learning Experiences
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I. (Cont.)

people in that environment. Why can't every plant grow anywhere. Why are there few plants in the polar region.

4. Creative dramatics: Pretend you're an elephant in a pond, a slithering snake catching a frog, a raccoon eating corn, etc.

5. Diarama: Farm (Show land use - crops, pasture; animals, buildings.) What determines a farming community? (seasonal changes, types of soil, rainfall, nearness to city markets)

6. Diagram: Life of any plant which grows in this area and its final products. EX.-potato. Potato plant-farmer harvests it-potato farm sorts according to size and into burlap bags-sold to factories or customers in stores-products (potato chips, French fries, etc.)

7. Read story of 3 pigs: Dramatize it. Make mural of houses built by 3 pigs. Or make models of homes from cardboard boxes. Real straw glued on one, sticks to another, building bricks or cardboard bricks. Where did the first little pig get the straw? (from a man) Where did the man get the straw? (grain) Where did second pig get the sticks? Where do sticks come from? Where did the third pig get the bricks? (clay, soil, sand)

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Cold Lands

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T influence on changes in land use and Problem Orientation Popul
centers of population density. Growth

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

Cognitive: The children will be able to discuss population growth & how this growth will affect changes in land use where they live.
Affective: The student will suggest how the increased birth rate in their community will affect land use & population density. The student will then volunteer ways in which this population growth can harm their own personal well being.

I. Student-Centered in class activity
A. Show movie, Family Planning.

II. C
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Skills to be Learned
Collecting
Organizing
Making tables, charts, graphs
Making judgements

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itions, population growth, Discipline Area Science

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Influence for change

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Problem Orientation

Population

Growth

Grade 6

OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class
activity

A. Show movie, Family Planning.

II. Outside Resource and
Community Activities

A. Have the class:

1. Collect the birth & obituary columns for 3 weeks from their local newspaper.
2. Compare & chart the birth & death rate.
3. Give individual reports on population increase.
4. Discuss the effect this increase will have on their community.

Resource and Reference Materials

Continued and Additional Suggested Learning

Publications:

Population Bomb, Paul Ehrlich
Newspapers

Audio-Visual:

Films:

Family Planning, #6959, Color,
BAVI, Walt Disney, 1967
Food and People, EBF, 1955,
BAVI, 3583

Community:

City Engineer
Project ICE representative

Materials	Continued and Additional Suggested Learning Experiences
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PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish format. Please feel free to adapt it and add more pages. Let us comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

For each episode used in your class, you may wish to duplicate this suggested form free to adapt it and add more pages. Let us know all your critiques and suggestions and positive.

Objectives

Used

Learning Experiences

Community Activities:

Source & Reference Materials
(Questions & comments)

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRON

ED055918

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 7

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in GESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338

Robert W
Robert K
George H

INSTRUCTION - CURRICULUM - ENVIRONMENT

PROGRAM FOR ENVIRONMENTAL EDUCATION

Science GRADE 7 *

Title III E.S.E.A.

in GESA's 3-8-9

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onsin 54301

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is of over a hundred teachers, year long meetings, a summer workshop, ecologists, this guide means realistic, developed aid for you. Please which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are designed--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your situation to adapt, adopt, or use. By design, the range of suggestions is mentation and usage are even wider. Many episodes are self-contained others can be changed in part or developed more keenly over a few possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning explan. The reasons are simple. No guide has all the answers and unless viewed in the context of your classroom situation. Thus, give it a triple reading, check over the resources listed, make prime your students, and seek help. The Project personnel and knowledge page stand ready to aid your efforts. Feel free to
4. The Project Resource Materials Center serves all CESA 3, 8, and private. We will send available materials pre-paid. Call for an visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library Center materials. Please offer suggestions, comments, or advice service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch suggestions on the episode pages or use the attached evaluation lected in late May next year and will be used in our revisions. reactions and suggestions--negative and positive. Please note that in the episodes may refer to specific, local community resource cases, individual school districts and teachers will have to adapt substitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--survival Creation's beauty and complexity--often noted as the work of a and human energy to save. A year's work by a hundred of your fee gesture. Without you, their work will crumble, and so might we let us live to think, feel, and act in harmony with our world.

Editor

1. Cognitive means a measurable mental skill, ability, or process
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels a cognitive)
4. EPA - Environmental Problem Area

PREFACE

excite students about their environment, help is ready. Thanks to the efforts of teachers, year long meetings, a summer workshop, university consultants and guide means realistic, developed aid for you. Please note the following ideas and teachers in writing and editing this guide.

supplementary in nature and the episodes are designed--at appropriate instances--into existing, logical course content.

Each episode offers suggestions. Since you know your students best, you decide what to use, or use. By design, the range of suggestions is wide; your chances for experimentation are even wider. Many episodes are self-contained, others open-ended, still others changed in part or developed more keenly over a few weeks. These built-in episodes allow you to explore.

What you try the episodes and suggested learning experiences but please prepare questions are simple. No guide has all the answers and no curriculum will work in the context of your classroom situation. Thus, before trying an episode, while reading, check over the resources listed, make mental and actual notes, discuss with students, and seek help. The Project personnel and teachers listed on the acknowledgment page stand ready to aid your efforts. Feel free to ask their help in pre-planning. The Source Materials Center serves all CESA 3, 8, and 9 area schools--public and private--and will send available materials pre-paid. Call for any help, materials, or to (312) 433-4338.

See the Project ICE Bibliography in your school library for available Resource Materials. Please offer suggestions, comments, or advice--at any time--so that this project can grow. Let's help each other.

Work with the guide by reacting to it with scratch ideas, notes, and extended questions. Use the episode pages or use the attached evaluation format, which will be collected May next year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed may refer to specific, local community resources or conditions. In such cases, individual school districts and teachers will have to adopt local or available substitutes. List of terms pertinent to the episodes is below.

Other experts have simplified the issue--survival--yours, mine, our students, our society and complexity--often noted as the work of a genius--will take our genius for granted. It is our duty to save. A year's work by a hundred of your fellow teachers is a saving grace. Without you, their work will crumble, and so might we all--literally. Instead, let us think, feel, and act in harmony with our world.

Editorial Board

Means a measurable mental skill, ability, or process based on factual data. Refers to student attitudes, values, and feelings.

Acceptable Performance Will Include (labels a cognitive or mental performance.)
Environmental Problem Area

ACKNOWLEDGEMENTS: The following teachers and consultants participated in the Supplementary Environmental Education

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John Cowling, Niagara
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Donald Marsh, Bonduel
David Miskulin, Goodman
Don Olsen, Shawano
Elmer Schabo, Niagara
Marion Wagner, Gillett
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Benjamin Roloff, Howard-Suamico
Greg Schmitt, Cathedral
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Emmajean Harmann, Sevastopol
Ray Gantenbein, Green Bay
David Bartz, Sturgeon Bay
John Hussey, Green Bay
Sister Barbara, St. Bernard

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UW-Marquette
ards, UW-Marquette
Ednajean Purcell, OSU
David West, Lawrence U.

Robert Cook, UWGB
Dennis Bryan, UWGB

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 N of all energy, is converted through plant
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 E photosynthesis into a form all living
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 T things can use for life processes.

Discipline Area

Subject

Problem Orient

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Having viewed a film concerning cycles and food chains, the student will indicate through a mobile construction, the concept of the sun as the basic source of all energy and the process of photosynthesis as a converter of energy into a utilisable source by other living organisms. APWI creating a mobile which illustrates the sun as an energy source being changed by photosynthesis to forms other organisms use, including the plant.

Affective: The student will offer suggestions concerning solutions to food chain crises when presented with such situations. Further, the student may investigate breakdowns in this food or energy chain in the community area as an outside project.

Skills to be Learned

(Cont.)

SUGGESTED LEARNING

- I. Student-Centered in class activity
 1. The student will view a short movie on food chains.
 2. Resource material on energy sources, hangers, string, paper, etc. will be supplied.
 3. Student will develop a food energy chain and indicate its flow by art work in the form of a mobile.
 4. The finished mobiles will be displayed and the student will explain his project.
 5. A movie entitled "Green Plants and Sunlight" will be shown with the specific purpose of the student evaluating his project as to completeness on the initial energy levels.

from the sun, the basic source
 energy, is converted through plant
 synthesis into a form all living
 organisms can use for life processes.

Discipline Area General Science
 Subject Life Science
 Problem Orientation Energy Grade 7

GENERAL OBJECTIVES

Having viewed a
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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. The student will view a short movie on food chains.
 2. Resource material on energy sources, hangers, string, paper, etc. will be supplied.
 3. Student will develop a food energy chain and indicate its flow by art work in the form of a mobile.
 4. The finished mobiles will be displayed and the student will explain his project.
 5. A movie entitled "Green Plants and Sunlight" will be shown with the specific purpose of the student evaluating his project as to completeness on the initial energy levels.

- II. Outside Resource and Community Activities
 1. Students may select any energy system in the local community and via art work, illustrate the total flow of energy from initial energy generation to the final product or use.

Resource and Reference Materials	Continued and Additional Sug
<p><u>Publications:</u></p> <p><u>"Foundations of Life Science"</u> Trump, Volker, Holt, Pub. 1971 Holt, Rinehart and Winston</p> <p><u>"Investigations Into Ecology"</u> Project I-C-E, 1927 Main St. Green Bay, WI - 54301</p> <p><u>"Communities - Science Curriculum Improvement Study", 1969</u> Univ. of California Berkeley, California 94720</p> <p><u>Audio-Visual:</u></p> <p>Posters of food chains on bulletin boards</p> <p>Film - <u>"Food Cycle and Food Chains"</u> (color) 5698 - (11 mins.) \$4.00 Bureau of Audio-Visual Instruction 1327 University Ave. P. O. Box 2093, Madison, WI 53701</p> <p><u>"Green Plants and Sunlight" (color)</u> (11 mins.) \$4.00 - Bureau of Audio- Visual Instruction-Madison, WI</p> <p><u>Community:</u></p>	<p>Skills to be Develop</p> <p>Organizing material</p> <p>Analyzing data</p> <p>Synthesizing resour</p> <p>Evaluating</p> <p>Art Skills</p> <p>Basic language skil</p>

Materials	Continued and Additional Suggested Learning Experiences
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	<p>Skills to be Developed - (cont.)</p> <ul style="list-style-type: none"> Organizing materials Analyzing data Synthesizing resource material for mobile construction Evaluating Art Skills Basic language skills in presentation to class

C 2. All living organisms interact among
 O
 N themselves and their environment,
 C
 E forming an intricate unit called an
 P
 T ecosystem.

Discipline Area

Subject

Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING ACTIVITIES

Cognitive: Upon completion, the student will be able to identify the types of plants & animals (insects) found in various 2 yd. sq. plots of pond water.
Affective: The student investigates the process of succession which is the target of man's uncontrolled technology and argues the point that man must limit it.

Skills to be Learned

Finding comparative data
 Discussion of succession & its changes on a community
 Skills in microscope use

- I. Student-Centered in class activity
 - A. Three gallon jars
 1. Place assortment of dead leaves, pond stones into 2/3 gal. of sterilized pond water. (Boil water 10 min.)
 2. Second jar-1" fine gravel & 2 qts. unsterilized water with several organisms from the pond.
 3. 3rd jar-Only 2/3 gal unsterilized pond water. Cover jars & place in indirect sunlight. Examine jars 3 times a week. Examine water from the jars with a microscope.
 4. Supply students with information for common pond water organisms.
 5. The student will analyze growth changes in each jar making comparisons and presenting results in a written paragraph form.
 6. Through observation of accumulated data, create a biological community illustrating the interaction of living things.

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their environment,

Discipline Area General Science

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Subject Life Science

Problem Orientation Ecosystem Grade 7

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Three gallon jars

1. Place assortment of twigs, dead leaves, pond stones into 2/3 gal. of sterilized pond water. (Boil water 2 min.)
2. Second jar-1" fine gravel & 2 qts. unsterilized pond water with several organisms from the pond.
3. 3rd jar-Only 2/3 gal. unsterilized pond water. Cover jars & place in indirect sunlight. Examine jars 3 times a week. Examine water from the jars with a microscope.
4. Supply students with a key for common pond water organisms.
5. The student will analyze growth changes in each jar, making comparisons and presenting results in written paragraph form.
6. Through observation of accumulated data, create a biological community illustrating the interaction of living things (cont.)

II. Outside Resource and
Community Activities

Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u> <u>Modern Life Science</u>, Hole, Fitzpatrick</p>	<p>I. (cont.) therein. A.P.W.I. setting up with sterilized & unsterilized fying by common name any org a 3 week growth period & obs each of the three jars based conditions. These changes w short paragraph & evaluated interpretation of data.</p>
<p><u>Audio-Visual:</u> <u>Films:</u> <u>Community</u>, (11 min.) Bureau of Audio Visual Instruction 1327 University Ave. P.O. Box 2093 Madison Wisconsin 53701 (\$4.00) <u>Life in a Drop of Water</u> (10 min.) Bureau of Audio Visual Instruction Key for Pond Life & Micro- organisms</p>	
<p><u>Community:</u></p>	

e Materials

Continued and Additional Suggested Learning Experiences

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I. (cont.)

therein. A.P.W.I. setting up a controlled experiment with sterilized & unsterilized pond water, classifying by common name any organisms which appear after a 3 week growth period & observing growth changes in each of the three jars based on environmental conditions. These changes will be presented in a short paragraph & evaluated on relevancy and correct interpretation of data.

1. Instruction
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1 Instruction
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Discipline Area Sci

Subject Lif

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> After digging up a legume type plant & observing its location in the ecosystem, the student will discuss the function of such plants in the nitrogen cycle & critically evaluate their effect on the system. A.P.W.I., a graphic illustration of the nitrogen cycle with a written explanation concerning the interaction of nitrogen & other organism.</p> <p><u>Affective:</u> The student will attempt to relate his knowledge of the nitrogen cycle to interactions within his environment. Acceptable performance would include investigating environmental crises which directly relate to the nitrogen cycle & suggesting ways by which such problems may be rectified.</p>	<p>I. Student-Centered in class activity</p> <p>A. Class project - The Nitrogen Cycle</p> <ol style="list-style-type: none"> 1. Materials needed: <ol style="list-style-type: none"> a. Shovel, spade, trowel, etc. b. Large container c. Tap water B. Class discussion <ol style="list-style-type: none"> 1. Discuss & diagram nitrogen cycle. 2. How does or how can the nitrogen cycle be related to the interactions within the ecosystem. C. Assignment: <ol style="list-style-type: none"> 1. Each member of class will summarize project & try to relate its use as example of interactions within our environment.
<p><u>Skills to be Learned</u></p> <p>Scientific method</p> <p>Comparison of Analogies</p> <p>Analysis of an Ecosystem</p>	

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Discipline Area Science

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Subject

Life Science

Problem Orientation Ecosystems Grade 7

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A. Class project - The Nitrogen Cycle
1. Materials needed:
 - a. Shovel, spade, trowel, etc.
 - b. Large container
 - c. Tap water
 - B. Class discussion
 1. Discuss & diagram nitrogen cycle.
 2. How does or how can the nitrogen cycle be related to the interactions within the ecosystem.
 - C. Assignment:
 1. Each member of class will summarize project & try to relate its use as example of interactions within our environment.

II. Outside Resource and Community Activities

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alogies
cosystem

Resource and Reference Materials
Publication:

Continued and Additional Suggeste

Audio-Visual:

Film:

Plant-Animal Communities-
Changing Balance of Nature
Coronet Films
The Community EBEC

Community:

University Professors
County Agent

Materials	Continued and Additional Suggested Learning Experiences
<p>1. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>2. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>3. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>4. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>5. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>6. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>7. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>8. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>9. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>10. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p>	<p>1. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>2. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>3. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>4. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>5. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>6. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>7. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>8. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>9. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p> <p>10. <i>Handbook of Mathematics</i> by J. H. Van der Waerden, North-Holland Publishing Co., Amsterdam, 1955.</p>

C 3. Environmental factors are limiting
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 N on the numbers of organisms living
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 E within their influence, thus, each
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 T environment has a carrying capacity.

Discipline Area Gen. Sci
 Subject Life Sci
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BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> By interpreting weight data, students should be able to show how limitations of areas are set by carrying capacity. A.P.W.I. planting, measuring & weighing plants of which the student will summarize in written form, the weight of the plant & the conditions it was grown in. The student will observe that different plants grow better in similar conditions.</p> <p><u>Affective:</u> The student will propose that components such as space, air, food, or water, may become limiting factors on the carrying capacity of an area.</p>	<p>I. Student-Centered in class activity</p> <p>A. In 4 soil containers (flat pans 18" sq.) place 2" of fertile soil. Number the pans from 1-4.</p> <p>Pan 1-Plant radish seeds 1" apart</p> <p>Pan 2-Plant tomato seeds 1" apart</p> <p>Pan 3-Alternate the radish & tomato seeds 1" apart</p> <p>Pan 4-Alternate radish & tomato seeds 1/2" apart</p> <p>Water all seeds & provide the same temp. & light conditions. At the end of 3 weeks, collect & weigh plants from each pan.</p>
<p><u>Skills to be Learned</u></p> <p>Garden technique (planting)</p> <p>Weighing</p> <p>Measuring</p> <p>Analyzing data</p> <p>Synthesizing data</p> <p>Evaluating data</p>	

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of organisms living

Discipline Area Gen. Science

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Subject Life Science

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Carrying
Problem Orientation Capacity Grade 7

OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class
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pans from 1-4.
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apart
Pan 2-Plant tomato seeds 1"
apart
Pan 3-Alternate the radish &
tomato seeds 1" apart
Pan 4-Alternate radish &
tomato seeds 1/2" apart
Water all seeds & provide the
same temp. & light conditions.
At the end of 3 weeks, collect
& weigh plants from each pan.

II. Outside Resource and
Community Activities

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ESEA Title III - 59-70-0135-1 Project I-C-E

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 E within their influence, thus, each Subject Life Scien
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BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> Students will study a certain living organism within a pre-selected local environment by tracing possible evolutionary history & development & will present outline of this development by means of graphs, chronological drawings & written reports.</p> <p><u>Affective:</u> The student will challenge the probability that each animal in the environment developed & survived change & still became an integral part of the carrying capacity of that environment with its relationships with other organisms in the environment.</p>	<p>I. Student-Centered in class activity</p> <p>A. Group or Class study</p> <ol style="list-style-type: none"> 1. All groups report to class on their possible theories as to the development of their organisms. 2. Group then connects links to form possible inter-relational evolution of whole area & its impact on carrying capacity. <p>Note: Regarding A1 May require some background in Genetics introduced by teacher in the classroom if students are not familiar with this area.</p> <p>Ex. a) Mutations b) Genes c) Dominant d) Recessive</p>
<p><u>Skills to be Learned</u></p> <p>Knowledge of:</p> <ul style="list-style-type: none"> Organisms of local area Interrelationships of organisms relating to carrying capacity of area Heredity & eugenics 	

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Discipline Area Gen. Science

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Problem Orientation Capacity

Grade 7

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Group or Class study

1. All groups report to class on their possible theories as to the development of their organisms.
2. Group then connects links to form possible inter-relational evolution of whole area & its impact on carrying capacity.

Note: Regarding A1

May require some background in Genetics introduced by teacher in the classroom if students are not familiar with this area.

Ex. a) Mutations

b) Genes

c) Dominant

d) Recessive

II. Outside Resource and
Community Activities

A. Divide Class into groups
of two-four.

1. Class will be introduced via field trip to the pre-selected local environments.
2. Each group will choose a living organism within this area for further study. (Plant or animal)
3. Each group will then prepare a detailed report or study on their organism tracing all possible links which led to the development of their organism in the environment.

Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p> <u>Charles Darwin & the Origin of</u> <u>the Species, Walter Karp</u> <u>Genetics is Easy, Philip</u> <u>Goldstein</u> <u>Methods of Vegetation Study,</u> <u>Ed. A. Phillips</u> </p> <p><u>Audio-Visual:</u></p> <p><u>Films:</u></p> <p> <u>Evolution of Vascular Plants,</u> <u>17 min., color, EBEC</u> <u>30 Basic Speech Experiences,</u> <u>Clark Publishing Co.</u> </p> <p><u>Community:</u></p>	

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Continued and Additional Suggested Learning Experiences

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Discipline Area Gene

Subject Life

Problem Orientation

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Students become familiar with one technique used to sample some populations of small plants. The student through the use of plant sampling in a selected area will determine the number of plants in the area & by carefully observing the environmental conditions, expose relationships between the number of plants present in the area & the conditions of the area. A.P.W.I. writing an organized summary of their study indicating why the population existed there in such types & numbers.
Affective: The student will support the statement that environmental resources determine the carrying capacity of an area.

Skills to be Learned

Observing
 Comparing
 Recording & interpreting data

SUGGESTED LEARNING

I. Student-Centered in class activity

A. Class work in pairs or groups

1. Toss sampling device
2. Each group sample plants found in 1 sq. met.

Note: Sample device-wire coat hanger 36 cm. in. dia.

3. Count & identify plants inside wire loop.

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Discipline Area General Science

Subject Life Science

Carrying

Problem Orientation Capacity Grade 7

REAL OBJECTIVES

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Note: Sample device-wire
coat hanger 36 cm. in
d.a.

3. Count & identify plants
inside wire loop.

II. Outside Resource and
Community Activities

A. Sampling plant populations

1. Look for suitable test
sites:

a. Survey lawns around
the school

b. Neighbor's yard

c. Vacant lots

d. Park

Examples of plants

found: Grass, dandelion,
plantain.

2. After determining
suitable plant pop.
sites, have students
select test sites:

a. Site area 100 sq.
meters

b. Portion sampled 1
sq. met.

Resource and Reference Materials
Publications:
Interaction of Man & the Biosphere,
Rand McNally & Company-Chicago

Continued and Additional Suggest

Audio-Visual:

Films:

Distribution of Plants & Animals,

16 min. \$6.00 - Bureau of
Audio-Visual Instruction
1327 University Ave. P.O. Box
2093, Madison, Wis. 53701

Desert, 22 min., Color, \$8.75,
Bureau of Audio-Visual Inst.,
Madison, Wis.

High Arctic Biome, 22 min.,
\$8.75, Bureau of Audio-Visual
Inst., Madison, Wis.

Community:

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Continued and Additional Suggested Learning Experiences

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4. An adequate supply of pure water
is essential for life.

Discipline Area _____
Subject _____
Problem Orientation _____

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Having constructed a micropond, the student will demonstrate with accumulated data that fresh water is essential for sustaining life. Evidence of this will be indicated by the effects foreign materials have on an unbalanced environment. Affective: From the results of experiments with his micropond, the student should demonstrate a change in attitude by taking a list of materials, which should not be used or put into the water, home to his family. Further change is evidenced by positive student reaction wherein the student proposes that such contamination must cease and that programs should be developed to end such pollution.

Skills to be Learned

(Cont. on reverse side)

SUGGESTED LEARNING

- I. Student-Centered in class activity
 1. Fresh Water Communities.....
 - a) An aquarium contains several kinds of H₂O, plants, fish, and snails.
 - b) Have plenty of water plants already established in this aquarium before you add the animals; use water plants you collect or elodea.
 - c) Students will make a useful study of a community in a micropond.
 1. type of algae found
 2. increase or decrease in population
 - d) Students develop a hypothesis on the nature of the rise and fall of the population in a micropond.
 2. Select a commonly used product which is flushed down home drains. An example would be: detergent auto polish, soap, water soluble paint, fertilizer (cont.)

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Discipline Area

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Subject

Life Science

Problem Orientation E.P.A. Water Grade 7

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in
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ties.....

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several kinds of H_2O ,
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the population in a
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2. Select a commonly used
product which is flushed
down home drains. An ex-
ample would be: detergent,
auto polish, soap, water
soluble paint, fertilizer

(cont.)

II. Outside Resource and
Community Activities

Publications:

High School Biology

BSCS - Green Version

Investigation into Ecology

Project I-C-E, CESA No. 9,

1927 Main Street, Green Bay,

Wisconsin 54301

Audio-Visual:Community:Skills to be Learned

(cont.)

Planning a pond

Accumulating appropriate pond
organisms

Analyzing and synthesizing data

Organize materials and scheme to
test organisms with pollutants

I. (Cont.)

insect poison, disinfectants,

3. Select an organism from the
pond to test the effect of such
introduced into a living enviro4. Write a brief outline of your
forming it. Be sure you know w
observations to make beforehand

I. (Cont.)

insect poison, disinfectants, toothpaste, hair spray, etc.

3. Select an organism from the micropond or use the whole pond to test the effect of such products once they are introduced into a living environment.

4. Write a brief outline of your experiment before performing it. Be sure you know what to test and what observations to make beforehand.

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Discipline Area Science

Subject Life Science

Water

Problem Orientation Pollution

BEHAVIORAL OBJECTIVES

Cognitive: Students will take samples of water from any source in area and send to Dept. of Health for analysis and prepare report for class on results.
Affective: The student will investigate his own water resources as to degree of pollution & attempt to suggest ways his water can be cleansed & preserved.

Skills to be Learned

Water sampling techniques
Use of state facilities to solve health problems
Interpreting experimental results
Acquiring new values pertaining to dangers of water pollution
Comparing results

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

*Note: Outside activities precede indoor activities

A. Analyzing samples

1. Each student will prepare slides of their samples for microscopic study in class.
2. Also samples will be sent to State Dept. of Public Health for expert analysis.
3. Students will prepare scientific report on their results for class presentation:
 - a. How samples collected
 - b. Where collected
 - c. Results of own tests
 - d. Results of state tests
 - e. Conclusions reached
4. All reports will be discussed in class with emphasis on local water problems & local differences.

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Discipline Area Science

Subject Life Science

Water

Problem Orientation Pollution Grade 7

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class activity

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 - a. How samples collected
 - b. Where collected
 - c. Results of own tests
 - d. Results of state tests
 - e. Conclusions reached
4. All reports will be discussed in class with emphasis on local water problems & local differences.

II. Outside Resource and Community Activities

A. Class activity: Water Sampling

1. Each member of class will take two samples of H₂O of area.
 - a. Each will sample their own home supply plus one other source in area.
 1. Other public place's water supply
 2. Any fresh water source: lake, stream, pond, marsh, etc.
 - b. Technique used:
 1. Use of water sampling kits if available.
 2. If kits are not available, use small glass jars with covers to collect samples.
 - a. All jars will be cleaned & sterilized before making sample. Butane torch can be used to sterilize spigot.
 - b. Jars will have tape affixed (cont.)

Resource and Reference Materials	Continued and Additional Suggested Le
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p><u>The Clean Brook</u>, Margaret Bartlett</p> <p><u>Water: Riches or Ruin</u>, Helen Bauer</p> <p><u>Busy Water</u>, Irma Simonton Black</p> <p><u>Lamotte Water Test Booklet</u></p> <p><u>DNR Booklet: Public Use Laws of Water in Wisconsin</u></p> <p><u>Minnesota State Dept. of Health: Analysis Reports on Mississippi River</u></p>	<p>II. (cont.)</p> <p>to outside after taking sample wi</p> <ol style="list-style-type: none"> 1. Place of sample 2. Date of sampling 3. Hour of sampling 4. Was torch used to sterilize fa place.
<p><u>Audio-Visual:</u></p>	
<p><u>Community:</u></p>	

Materials	Continued and Additional Suggested Learning Experiences
<p>et</p> <p>on Black</p> <p>let</p> <p>Laws of</p> <p>of Health:</p> <p>ssissippi</p>	<p>II. (cont.)</p> <p>to outside after taking sample with:</p> <ol style="list-style-type: none"> 1. Place of sample 2. Date of sampling 3. Hour of sampling 4. Was torch used to sterilize faucet if public place.

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BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING P
<p>Cognitive: Given 4 bottles of water & strands of the plant Spirogyra, the student will observe the effect of various degrees of impurity on the cell contents & appearance. APWI the drawing of each strand of Spirogyra as it appeared in the various samples of salt impregnated water.</p> <p>Affective: After performing the Spirogyra activity, the student will demonstrate his attitude change by discussing the reasons as to why the plants reacted differently, suggesting implications on the total environment. Evidence of this is observed by students commenting on ways water resources should be handled & proposals being made as to action they could take for such resource management.</p>	<p>I. Student-Centered in class activity</p> <p>A. Marine Communities</p> <ol style="list-style-type: none">1. 4 bottles of different salt solution.<ol style="list-style-type: none">a. 1 tsp. in first pt.b. 4 tsp. in second pt.c. 8 tsp. in third pt.d. 16 tsp. in fourth pt.e. 1 bottle pure water2. With medicine dropper, place drop of fresh water on microscope slide.3. With forceps, place a strand of spirogyra in the water on the slide. Have a cover slip over the drop & study under the microscope. (Note green, spiral chloroplast in each cell)4. Now place a drop ow weakest salt solution on another microscope slide, add spirogyra & cover slip.5. Observe changes in cells content & appearance.6. Repeat procedure with other salt solutions.
<p><u>Skills to be Learned</u></p> <p>Practice in preparing slides</p> <p>Using microscope</p> <p>Analyze experimental data</p> <p>Synthesize results</p>	<p>(cont.)</p>

ESEA Title III - 59-70-0135-1 Project I-C-E

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Discipline Area General Science

Subject Life Science

Water

Problem Orientation Quality Grade 7

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Marine Communities

1. 4 bottles of different salt solution.
 - a. 1 tsp. in first pt.
 - b. 4 tsp. in second pt.
 - c. 8 tsp. in third pt.
 - d. 16 tsp. in fourth pt.
 - e. 1 bottle pure water
2. With medicine dropper, place drop of fresh water on microscope slide.
3. With forceps, place a strand of spirogyra in the water on the slide. Have a cover slip over the drop & study under the microscope. (Note green, spiral chloroplast in each cell)
4. Now place a drop of weakest salt solution on another microscope slide, add spirogyra & cover slip.
5. Observe changes in cells content & appearance.
6. Repeat procedure with other salt solutions.
(cont.)

II. Outside Resource and
Community Activities

A. Outside activity

1. Students will collect samples of water from a minimum of six differing areas. The student should attempt to acquire water from severely polluted areas (water high in toxic material) in the community or adjoining area.
2. The collected water will then be subjected to similar strains of Spirogyra and the effect on each one recorded.
3. The water collected should include some which is presumably high in inorganic toxic material.
4. Have students test the effect of a specific inorganic substance such as CuSO_4 on the Spirogyra organism. Discuss the long range effects of such materials.

Resource and Reference Materials

Publications:

Sea Shores, H. Zim & L. Ingle,
New York, Simon & Schuster, 1955
Environments, Teacher's Guide,
SCIS, Rand McNally & Co.

Audio-Visual:

Film:

Life in a Drop of Water, 10 min.,
\$2.00, Bureau of Audio-Visual
Instruction, 1327 University Ave.
P.O. Box 2093, Madison, Wis. 53701

Equipment:

Microscope
Micro-slide
Cover slips
4 qt. jars
Teaspoon
Eye dropper
Scalpel
Forceps
Salt
Spirogyra

Community:

Continued and Additional Suggested Learning

I. (cont.)

7. Make a note of the time it takes
any changes in the appearance of
each of the solutions.
8. Repeat same procedure using:
 - a. Protozoans
 - b. Algae
 - c. Elodea

Materials	Continued and Additional Suggested Learning Experiences
<p>Ingle, ster, 1955 Guide, s.</p> <p>2, 10 min., o-Visual iversity Ave. n, Wis. 53701</p>	<p>I. (cont.)</p> <ol style="list-style-type: none"> 7. Make a note of the time it takes before you see any changes in the appearance of spirogira for each of the solutions. 8. Repeat same procedure using: <ol style="list-style-type: none"> a. Protozoans b. Algae c. Elodea

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Discipline Area Scien

Subject Life

Problem Orientation

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

Cognitive: Students will make survey reports on indicator organisms that live in fresh water to show importance of clean water to maintain the balanced water community.

Affective: Students propose that future generations will take care of our water resources with more concern than present and past generations and attempt to design a plan for preserving a local water resource.

Skills to be Learned

Accumulating scientific data

Knowledge of relationships between organisms

Understanding of how or why all living things are dependent on clean water

Understanding of the DNR and its role in protecting our non-renewable resources

SUGGESTED LEARNING

I. Student-Centered in class activity

A. Class discussion-Compare all indicator organisms and their problems to show all effects of water pollution on all living creatures.

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Discipline Area Science

Subject Life Science

Water

Problem Orientation Quality Grade 7

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
<p>Students will ports on isms that ater to of clean in the community. Students ture l take er more esent tions design erving esource.</p>	<p>I. Student-Centered in class activity A. Class discussion-Compare all indicator organisms and their problems to show all effects of water pollution on all living creatures.</p>	<p>II. Outside Resource and Community Activities A. Divide class into groups & give each group an indicator organism to study that is or was native in your area. Example - Trout 1. What quality of H₂O must trout have to survive? a. Temperature b. Purity levels c. Food organisms in stream need d. Oxygen levels needed e. Protective Cover f. Upper watershed conditions g. Erosional rates 2. How does your area stack up to above conditions? 3. Survey actual trout population. 4. List factors in your area which have led to lowering trout population or may in the future. 5. Check with DNR on present condition of trout streams in Wisconsin. What is being done by state to</p>
<p>arned cientific relationships isms of how or g things are clean water of the DNR in protecting able resources</p>		<p>(cont.)</p>

Resource and Reference Materials	Continued and Additional Suggested Learning Activities
<p><u>Publications:</u></p> <p>Books:</p> <p> <u>The Clean Brook</u>, Margaret <u>Bartlett</u> <u>Water, Our Most Valuable</u> <u>Natural Resource</u>, Ivah Green <u>Rivers</u>, Delia Goetz. </p> <p><u>Audio-Visual:</u></p> <p><u>Community:</u></p> <p> DNR Wisconsin Conservation Bulletins Local DNR Fish Management official </p>	<p>II. (cont.)</p> <p>rehabilitate streams.</p> <p>6. List possible cures which might to improve deteriorating conditions.</p> <p>7. Show the relationship between streams and water quality.</p>

Source Materials	Continued and Additional Suggested Learning Experiences
<p>Margaret</p> <p>Quable</p> <p>Ivahn Green</p>	<p>II. (cont.)</p> <p>rehabilitate streams.</p> <p>6. List possible cures which might be undertaken to improve deteriorating conditions.</p> <p>7. Show the relationship between all life in the streams and water quality.</p>

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5. An adequate supply of clean air is
essential because most organisms
depend on oxygen, through respiration,
to release the energy in their food.

Discipline Area Science

Subject Life

Problem Orientation A

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Students will prepare group research papers of effects of air pollution on various diseases by collecting data, articles, statistics, & writing to states & cities to find any facts that pertain to air pollution and its effect as a disease causing agent.</p> <p><u>Affective:</u> This exercise will allow groups of students to carry on a detailed research on the effects of pollution of our air & how it affects the nations health. Hopefully the student will volunteer ideas indicating that polluted air is a hazard to all living things & to all future generations.</p>	<p>I. Student-Centered in class activity</p> <p>A. Group research paper</p> <ol style="list-style-type: none"> Class will be divided into 4-5 groups with a group leader or chairman Each group will conduct a survey on the effects of air pollution & the contraction rate of their disease. Possible study areas: <ol style="list-style-type: none"> Lung cancer Heart disease Emphysema Tuberculosis Pneumonia Bronchitis & other respiratory ailments Group leaders will assign study areas: <ol style="list-style-type: none"> Regional Areas (State Health Depts.) Large Cities (Health Depts.) Library research Magazine & newspaper articles Interviews: <ol style="list-style-type: none"> Local Health Office Physicians, etc.
<p><u>Skills to be Learned</u></p> <p>Journalism skills</p> <p>Data collecting</p> <p>Understanding of the real danger of air pollution</p> <p>Understanding the principle of diffusion & the realization that air pollution (to a degree) reaches (cont.)</p>	

supply of clean air is

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Discipline Area Science

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Subject

Life Science

energy in their food.

Problem Orientation Air Pollution Grade 7

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Group research paper

1. Class will be divided
into 4-5 groups with a
group leader or chairman.
2. Each group will conduct
a survey on the effects
of air pollution & the
contraction rate of their
disease.

3. Possible study are

- a. Lung cancer
- b. Heart disease
- c. Emphysema
- d. Tuberculosis
- e. Pneumonia
- f. Bronchitis & other
respiratory ailments

4. Group leaders will assign
study areas:

- a. Regional Areas (State
Health Depts.)
- b. Large Cities (Health
Depts.)
- c. Library research
- d. Magazine & newspaper
articles
- e. Interviews:
 1. Local Health Officials
 2. Physicians, etc. (cont.)

II. Outside Resource and
Community Activities

Resource and Reference Materials	Continued and Additional Suggested L
<p><u>Publications:</u></p> <p><u>This Vital Air</u>, Thomas Aylesworth</p> <p><u>The World You Inherit: A Story of Pollution</u>, John Gabriel Navarra</p> <p><u>Let's Go to Stop Air Pollution</u>, Michael Chester</p> <p><u>Dangerous Air</u>, Lucy Kavalier</p> <p><u>30 Basic Speech Experiences</u>, Clark Publishing Co.</p> <p><u>Audio-Visual:</u></p> <p><u>Community:</u></p> <p>City Health Dept.</p> <p>State Health Dept.</p> <p>DNR</p> <p>Local Pollution & Health Officials</p> <p>Local Politicians</p>	<p><u>Skills to be Learned (cont.)</u></p> <p>everywhere</p> <p>Ability to evaluate & draw conclusions</p> <p>I. (cont.)</p> <p>f. Health bulletins & manuals</p> <p>g. Wilderness area or States</p> <p>5. Each group will accumulate material for report for class presentation.</p> <p>a. All presented material will include bibliography of sources.</p> <p>b. Each group will attempt to show that air pollution has or has not increased the contraction rate of their population depending on their conclusions.</p> <p>c. Class discussion (Possible areas)</p> <p>a. Question & answer period</p> <p>b. Present day air pollution problem</p> <p>c. Affect: Cities, rural & wilderness</p> <p>d. Future of air pollution problem</p> <p>1. Legislation</p> <p>2. Industrial</p> <p>3. Transportation, etc.</p> <p>e. Summary & conclusions (Values)</p>

Materials	Continued and Additional Suggested Learning Experiences
Wylesworth Story Miel Navarra olution, ler ces,	<p><u>Skills to be Learned (cont.)</u></p> <p>everywhere</p> <p>Ability to evaluate & draw conclusions</p> <p>I. (cont.)</p> <ul style="list-style-type: none"> f. Health bulletins & manuals g. Wilderness area or States <p>5. Each group will accumulate material & prepare report for class presentation.</p> <ul style="list-style-type: none"> a. All presented material will be verified bibliography of sources. b. Each group will attempt to show unbiased proof that air pollution has or has not affected the contraction rate of their particular disease depending on their conclusions from their study. <p>6. Class discussion (Possible areas):</p> <ul style="list-style-type: none"> a. Question & answer period b. Present day air pollution problems c. Affect: Cities, rural & wilderness areas d. Future of air pollution problems: <ul style="list-style-type: none"> 1. Legislation 2. Industrial 3. Transportation, etc. e. Summary & conclusions (Values - before & now)
Officials	

C 5. An adequate supply of clean air is
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 N essential because most organisms
 C
 E depend on oxygen, through respiration,
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 T to release the energy in their food.

Discipline Area Gene
 Subject Life
 Problem Orientation A

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> By the use of Bromthymol blue solution & Elodea plants, the student will observe the product of photosynthesis by inverse measurement of CO₂. The student will then orally discuss the use of CO₂ in photosynthesis, where the oxygen went & what it was used for. (Respiration)</p> <p><u>Affective:</u> The student will suggest that living organisms need air to survive and assist in energy release within the organism itself. The student will then attempt to observe the use of oxygen by the plant.</p>	<p>I. Student-Centered in class activity</p> <p>A. The Use of CO₂ by Plants</p> <ol style="list-style-type: none"> 1. Pour bromthymol blue solution into a beaker & add aquarium water to fill 6 test tubes. 2. With a straw, blow your breath into the bromthymol solution in beaker. 3. CO₂ turns bromthymol blue solution yellow showing 4. Place a sprig of water plant into each of 4 test tubes. 5. Fill all 6 test tubes with yellow solution & stopper them. 2 test tubes-control 6. All test tubes in medium sunlight & air tight containers. <p>B. Student investigation of use of CO₂ by plants.</p> <ol style="list-style-type: none"> 1. Color of yellow bromthymol blue 2. Kind of light photosynthesis occurs at its optimum. (tubes with cellophane.) 3. The student will then determine where the oxygen goes when produced by the plant as CO₂ is used up.
<p><u>Skills to be Learned</u></p> <p>Comparing & recording data</p> <p>Discussion of environmental effects of air pollution</p>	

adequate supply of clean air is

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Discipline Area General Science

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Life Science

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Problem Orientation Air Pollution Grade 7

BEHAVIORAL OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. The Use of CO₂ by Plants

1. Pour bromthymol blue solution into a beaker & add aquarium water to fill 6 test tubes.
2. With a straw, blow your breath into the bromthymol solution in beaker.
3. CO₂ turns bromthymol blue solution yellow showing CO₂.
4. Place a sprig of water plant into each of 4 test tubes.
5. Fill all 6 test tubes with yellow solution & stopper them. 2 test tubes-controls.
6. All test tubes in medium sunlight & air tight con containers.

B. Student investigation of use
of CO₂ by plants.

1. Color of yellow bromthymol blue
2. Kind of light photosynthesis occurs at its optimum. (Wrap tubes with cellophane.)
3. The student will then discuss where the oxygen goes which is produced by the plant as the CO₂ is used up.

II. Outside Resource and
Community Activities

Resource and Reference Materials
Publications:

Continued and Additional Suggested Le

Audio-Visual:

Equipment:

6 test tubes & stoppers

Elodea

25 ml of 0.1% bromthymol blue

Films:

5553 Photosynthesis

22 min., 1963, \$8.78,

Bureau of Audio-Visual Inst.

1327 University Ave.

P.O. Box 2093, Madison, Wis. 53701

6743 Green Plants & Sunlight

Color, 11 min. \$4.00, EAVI,

Madison

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Continued and Additional Suggested Learning Experiences

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Subject Lif

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Problem Orientation

BEHAVIORAL OBJECTIVE	SUGGESTED LEARNING ACTIVITIES
<p>Cognitive: Students will visit local industry and conduct survey to find out what (if anything) is being done to combat air pollution in their plant. They will then prepare a written summary of their visit.</p> <p>Affective: The student will visit a local industry to investigate pollution in the "now" and attempt to suggest possible solutions to those problems.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> Pollution Survey Assignment <ol style="list-style-type: none"> Divide class into small groups or pairs <ol style="list-style-type: none"> Have each group contact local industry for acceptance of visit. (Explain reason) After acceptance, make sure that each group has a different industry. Written survey: <ol style="list-style-type: none"> Explain industry Possible causes of pollution (by products) Methods of prevention by industry Conclusions gained by visit Panel of survey groups <ol style="list-style-type: none"> Use one member of each survey group to form panel Panel studies and collects surveys: <ol style="list-style-type: none"> Lists problems (different ones) Solutions being used Panel solutions or conclusions
<p><u>Skills to be Learned</u></p> <p>Human relations and cooperation</p> <p>Problem solving</p> <p>Journalism skills</p> <p>Knowledge of pollution laws</p> <p>Units of measurements and statistics skills</p>	<p>class discus- sion panel</p> <p>(cont.)</p>

ESEA Title III -59-70-0135-1 Project I C E

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cause most organisms

Discipline Area General Science

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Life Science

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Problem Orientation Pollution

Grade 7

OBJECTIVE

SUGGESTED LEARNING EXPERIENCES

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- I. Student-Centered in class activity
1. Pollution Survey Assignment
 - a. Divide class into small groups or pairs
 1. Have each group contact local industry for acceptance of visit. (Explain reason)
 2. After acceptance, make sure that each group has a different industry.
 - b. Written survey:
 1. Explain industry
 2. Possible causes of pollution (by products)
 3. Methods of prevention by industry
 4. Conclusions gained by visit
 - c. Panel of survey groups
 1. Use one member of each survey group to form panel
 2. Panel studies and collects surveys:
 - a. Lists problems (different ones)
 - b. Solutions being used
 - c. Panels solutions or conclusions
- (cont.)

II. Outside Resource and Community Activities

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Resource and Reference Materials
Publications:

Continued and Additional Suggested L
Part I cont.

- d. Class drafts (majority opinion) Laws.
- e. Compare with existing local and laws.

Audio-Visual:

Community:

- Local Chamber of Commerce
- List of local pollution laws
- List of state pollution controls
- Local congressman
- Interviewed or visit to class to explain own views on pollution controls
- Division of Environment Protection (DNR)

Materials	Continued and Additional Suggested Learning Experiences
<p> Laws Controls Class to Pollution Protection </p>	<p> Part I cont. d. Class drafts (majority opinion) own Pollution Laws. e. Compare with existing local and state pollution laws. </p>

C 6. Natural resources are not equally

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N distributed over the earth or over

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E time and greatly affect the geographic

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T conditions and quality of life.

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BEHAVIORAL OBJECTIVES

Cognitive: Through the observation of ant hill populations and guppy populations, the student will list in written form the geographic conditions responsible for larger populations of these species. Likewise, the student will analyze those conditions responsible for smaller populations and compare the two lists of geographic conditions.

Affective: The student will support the results of his data with the proposal that natural resources are not distributed equally and thus affect the quality of life.

Skills to be Learned

Observation

Systematic counting

Comparing data

Writing a scientific report

Analyzing data

SUGGESTED LEARNING EXP

I. Student-Centered in class activity

II. C

1. Observe a guppy population in an aquarium. Determine the size of the population and population density over a period of time seeing if the population fluctuates.

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Problem Orientation

Population

Grade

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OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Observe a guppy population in an aquarium. Determine the size of the population and population density over a period of time seeing if the population fluctuates.

- II. Outside Resource and Community Activities
1. Find an ant hill or nest of carpenter ants. Try to estimate the number of organisms. Try to determine the population density. (Use ants per hill or nest.) Determine the expected fluctuations in the ant population.

Materials	Continued and Additional Suggested Learning Experiences
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patrick - Biosphere,	
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plants & 6 min. usual sity Madison,	
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C 7. Factors such as facilitating transportation,
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 N economic conditions, population growth, Discipline Area
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 E and increased leisure time have a great Subject
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 T influence on changes in land use and Problem Orientation
 centers of population density.

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> Students will compile lists of all changes of land use for human considerations rather than for the balance of the environment. He will then report on one case on list extensively that has definite impact on local area.</p> <p><u>Affective:</u> Using own scientific techniques, students will advocate or reject the way man has viewed the overall environment as compared to the importance of man's immediate & material gains.</p>	<p>I. Student-Centered in class activity</p> <p>A. Research Project</p> <p>1. Part One</p> <p>a. Compile an extensive list of all man's changes of the environment which have resulted from factors other than preservation of the environment.</p> <p>b. Separate list into areas: Local community, county, state & national</p> <p>2. Part Two</p> <p>a. Extensive research report on one land use change on your list (Local area would be a better first hand report)</p> <p>b. Encourage:</p> <p>1. Objectivity</p> <p>2. Opinions of local people</p> <p>3. Overall impact</p> <p>4. Conclusions</p> <p>3. Part Three</p> <p>a. All students should present their research report to class for overall discussion & evaluation. This will present the class with information that will classify</p>
<p><u>Skills to be Learned</u></p> <p>Scientific technique</p> <p>Problem solving</p> <p>Decision making</p> <p>Personal values</p>	

such as facilitating transportation,

conditions, population growth, Discipline Area Science

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on changes in land use and Problem Orientation Land Use Grade 7
of population density.

LEARNING OBJECTIVES

Students will
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Research Project

1. Part One

a. Compile an extensive
list of all man's
changes of the environ-
ment which have resulted
from factors other than
preservation of the
environment.

b. Separate list into 4
areas: Local community,
county, state & national.

2. Part Two

a. Extensive research
report on one land use
change on your list.
(Local area would allow
better first hand report)

b. Encourage:

1. Objectivity
2. Opinions of local people
3. Overall impact of change
4. Conclusions

3. Part Three

a. All students should present
their research reports to
class for overall discussion
& evaluation. This will
present the class with values
that will classify as (cont.)

II. Outside Resource and
Community Activities

Materials

Continued and Additional Suggested Learning Experiences

I. (cont.)

group or lasting individual values. Each environmental change should be examined as to reason and/or capital gain. Location and date of change.

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C 7. Factors such as facilitating transportation,
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 N economic conditions, population growth, Discipline Area
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 E and increased leisure time have a great Subject
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 T influence on changes in land use and Problem Orienta
centers of population density.

BEHAVIORAL OBJECTIVES

SUGGESTED I

Cognitive: Each student will compile a list of any instances where the natural environment in an area was changed to satisfy man's desires or gains, then give reasons for making those changes.

Affective: The student will investigate the values of past and present generations of the American public & suggest why these values have to be replaced by values that benefit all organisms.

Skills to be Learned

Recognizing the mistakes of the past

Understanding & comparing accumulative data

Knowledge of values

Independent study & thought processes

I. Student-Centered in class activity

A. Classroom

1. All students are asked to list & compile a list in which the natural environment has been altered for man's use. Examples:
 - a. Road & bridge construction
 - b. Commercialism (tourism)
 - c. Economic gain (development)
 - d. Transportation
 1. Railroads
 2. SST
 3. Combustion engines
 - e. Housing projects
 - f. Real estate projects
 - g. Civil corps of Engineers
 1. Dams
 2. Hydro Electric
 - h. Recreation areas
 1. Disneyland
 2. Parks & camps
 3. KOA & other
2. Each student will list reasons man may have made these changes in land. (Man's value)
3. Class discussion:
 - a. Compile & compare of all students.

as facilitating transportation,

tions, population growth, Discipline Area Science

leisure time have a great Subject Life Science

changes in land use and Problem Orientation Land Use Grade 7
ulation density.

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
student list of ere the ment in ged to esires give ng those student e the values ent genera- erican public hese values aced by efit all	I. Student-Centered in class activity A. Classroom 1. All students are assigned to list & complie any case in which the natural environ- ment has been altered by man for mans use. Examples: a. Road & bridge construction b. Commercialism (tourism) c. Economic gain (short term) d. Transportation 1. Railroads 2. SST 3. Combustion engine e. Housing projects f. Real estate profits g. Civil corp of Engineers 1. Dams 2. Hydro Elec. plants h. Recreation areas 1. Disneylands 2. Parks & campgrounds 3. KOA & other chains 2. Each student will then list reasons man may have used to make these changes in our land. (Man's values) 3. Class discussion: a. Complie & compare lists of all students. (cont.)	II. Outside Resource and Community Activities
arned e mistakes & comparing data values udy & thought		

Resource and Reference Materials	Continued and Additional Suggested L
<p><u>Publications:</u></p> <p><u>Books:</u></p> <p> <u>The World You Inherit</u>, John Navarra <u>Our Polluted World</u>, John Perry <u>This Crowded Planet</u>, Margaret Hyde </p> <p><u>Audio-Visual:</u></p> <p><u>Film:</u></p> <p> <u>City Reborn</u>, Color, 22 min., \$3.50, BAVI, Madison, Wis. </p> <p><u>Community:</u></p>	<p>I. (cont.)</p> <p> b. List of values by class which changes in our environment. c. Class development of new value d. Reasons why we need new values e. Summary. </p>

rials

Continued and Additional Suggested Learning Experiences

I. (cont.)

- b. List of values by class which led to these changes in our environment.
- c. Class development of new values.
- d. Reasons why we need new values.
- e. Summary.

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C 8. Cultural, economic, social, and
 O
 N political factors determine status
 C
 E of man's values and attitudes
 P
 T toward his environment.

Discipline Area

Subject

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEAP
<p><u>Cognitive:</u> Students will work on a small group activity designed to show how man's values & attitudes have been shaped by factors other than the preservation of the natural environment. APWI resourcing the problems from various provided viewpoints, organizing the material and presenting it verbally to the class, illustrating changes in man's values & attitudes as influenced by the negative use of our natural environment.</p> <p><u>Affective:</u> The student will defend the fact that the status of man's values toward his environment must be re-evaluated and emphasis placed on mutual harmony with nature.</p>	<p>I. Student-Centered in class activity</p> <p>1. Class will be divided into 4 groups to show above concept. Ex.:</p> <p>a. Activity #1 - Utilizing water-use figures, student can graph consumption rate for their local community. Factors that contribute to increased water consumption can be developed by class.</p> <p>b. Activity #2 - Students can project the effect on the world supply of natural resources if a country were to become highly westernized. For example, if China were to have the same number of automobiles per capita as the U.S.</p> <p>c. Activity #3 - Assume that a small community were to be a location of a large factory employing several hundred people. Have students predict the effect of the sudden rise in population on the natural resources of the area.</p> <p>d. Activity #4 - A class or group might list the number of amounts of (Cont.)</p>
<p><u>Skills to be Learned</u></p> <p>Using graphs & their interpretation</p> <p>Understanding the danger to all life of overpopulation</p> <p>Development of self-appraisal of one's own values.</p>	

, economic, social, and

Factors determine status

Discipline Area

Science

Values and attitudes

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Problem Orientation Resource Use

Grade

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AL OBJECTIVES

Students will
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Class will be divided into 4 groups to show above concept. Ex.:

a. Activity #1 - Utilizing water-use figures, students can graph consumption rates for their local community. Factors that contribute to increased water consumption can be developed by class.

b. Activity #2 - Students can project the effect on the world supply of natural resources if a country were to become highly westernized. For example, if China were to have the same number of automobiles per capita as the U.S.

c. Activity #3 - Assume that a small community were to be a location of a large factory employing several hundred people. Have students predict the effect of the sudden rise in population on the natural resources of the area.

d. Activity #4 - A class or group might list the number of amounts of (Cont.)

II. Outside Resource and Community Activities

Resource and Reference Materials
Publications:

The Effects of Overpopulation by
Richard S. Kimball, J. Weston
Walch, Publisher, Portland, Maine
Proj. I-C-E RMC
Population Bomb by Paul Ehrlich,
New York, Ballentine Books.
World Almanac

Audio-Visual:

Films:

#6429 - Bulldozed America,
25 min., Bureau of Audio-
Visual Instruction, 1327
University Ave., P.O. Box 2093,
Madison, WI 53701.
#2996 - Man's Impact on His
Environment, color, 22 min, 1969
BAVI, Madison, Wisc.

Community:

City Water Departments
local city officials
Ford Motors, Detroit, Mich.

Continued and Additional Suggested

I. (Cont.)

- natural resources that are
of an automobile. A similar
that were used in the manu
could be developed and a co
2. Each group will also list
study area and what possible
problems in the future.
3. Groups will present their
for discussion and possible

C 10. Short-term economic gains may
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Discipline Area Scien

Subject Life

Problem Orientation R

BEHAVIORAL OBJECTIVES

Cognitive: Students will (in groups) research & orally report on historic blunders of man which have backfired on him in his efforts to achieve short term economic gains.
Affective: The student will support how man has hastened the destruction of his environment, with his shortsightedness & greed, with the need for developing future values which will prevent this from happening in the future.

Skills to be Learned

Knowledge of
 Statistics & its evaluation
 Development of environmental values
 Need for better planning & experimentation before implementation

SUGGESTED LEARNING

- I. Student-Centered in class activity
 - A. Class project
 1. Divide class into groups of 2 to 4 or 4 to 6.
 2. Each group conducts a survey or report on local or national instances of actual instances which prove the #10 concept. Possible examples:
 - a. Introduction of carp from Europe
 - b. Introduction of Dutch Elm disease to U.S.
 - c. Introduction of citrus fruit trees which brought in the scaley insect
 - d. Introduction of Japanese beetle
 - e. Introduction of potato blight
 - f. Hoof & mouth disease from Mexico

economic gains may

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Discipline Area Science

Subject Life Science

Problem Orientation Resources Grade 7

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Class project

1. Divide class into groups
of 2 to 4 or 4 to 6.
2. Each group conducts a
survey or report on local
or national instances of
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prove the #10 concept.
Possible examples:
 - a. Introduction of carp
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 - b. Introduction of Dutch
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 - c. Introduction of citrus
fruit trees which brought
in the scaley insect
 - d. Introduction of Japanese
beetle
 - e. Introduction of potato
blight
 - f. Hoof & mouth disease
from Mexico

II. Outside Resource and
Community Activities

Materials

Continued and Additional Suggested Learning Experiences

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C 10. Short-term economic gains may
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Discipline Area Science
 Subject Life Science
 Problem Orientation Economic

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Through the use of magazine pictures, the student will construct a collage showing man's technology in terms of short-term economic gain & by a short written report indicating the effect these technological short cuts have as long-term environmental losses.</p> <p><u>Affective:</u> The student will attempt to recommend how man should gear his technology, taking into consideration environmental losses which might evolve. Acceptable performance includes the student volunteering alternative solutions to man's short cut technology or how man should develop technology in the future.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Students bring magazines to class such as <u>Look</u>, <u>Life</u>, <u>Fortune</u>, etc. and cut out pictures of man's technological short cuts. 2. Arrange pictures in a collage sequence & have student write a short caption for each picture indicating the effect such technological short cuts have on the environment. 3. Students will discuss how man's technology should consider environmental effect.
<p><u>Skills to be Learned</u></p> <p>Observing Listing Reporting Art work Researching</p>	

economic gains may

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Discipline Area Science

Subject Life Science

Problem Orientation Economics Grade 7

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Students bring magazines to class such as Look, Life, Fortune, etc. and cut out pictures of man's technological short cuts.
2. Arrange pictures in a collage sequence & have student write a short caption for each picture indicating the effect such technological short cuts have on the environment.
3. Students will discuss how man's technology should consider environmental effect.

II. Outside Resource and Community Activities

A. Out of class

1. The student will take a trip through the community on a school bus & watch for areas where man has taken short cuts in building projects, waste disposal, etc.
2. The student will list these instances & report orally to the class the results. The student will also hypothesize the effect such short-term economic gains will have on the environment.

Resource and Reference Materials	Continued and Additional Suggested Learning
<p><u>Publications:</u></p> <p> <u>Man & the Biosphere,</u> <u>Rand McNally Co.</u> <u>Air & Water Pollution,</u> <u>Perma bound books</u> <u>God's Own Junkyard,</u> <u>Holt Rinehart & Winston, 1964</u> </p> <p> <u>Audio-Visual:</u> <u>7251-7252 What Are We Doing to</u> <u>Our World, 54 min., color,</u> <u>Bureau of Audio-Visual Inst.</u> <u>1327 University Ave.</u> <u>Madison, Wisconsin 53701</u> </p> <p> <u>Community:</u> <u>City engineer</u> <u>Industrial ecologist</u> </p>	

Materials	Continued and Additional Suggested Learning Experiences
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64

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C 11. Individual acts, duplicated
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 N or compounded, produce significant
 C
 E environmental alterations over time.
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Discipline Area Science
 Subject Life
 Problem Orientation A

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Through the use of photography, the student will construct a slide sequence showing individual acts which have resulted in a degraded environment. The student will present his slides to the class using any means of verbal presentation he desires. (Ex. tape recorder, self-narration).
Affective: The student will support and defend what he considers and individual act resulting in environmental alteration. He will also attempt to propose how these individual acts should be controlled to save the environment.

I. Student-Centered in class activity
 1. The student will select partners, acquisition a camera and film.

Skills to be Learned

Photography
 Organization of a slide series
 Observing
 Speaking skills
 Creativity in slide presentation.

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roduce significant

Discipline Area Science

terations over time.

Subject

Life Science

Individual

Problem Orientation Acts

Grade 7

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
the use uct a ing ch t. The t his using ires. self- dent fend nd lting in ation. t to ndivi- con- environ-	I. Student-Centered in class activity 1. The student will select partners, acquisition a camera and film.	II. Outside Resource and Community Activities 1. The student will go into the community and photograph acts which lead to the degradation of the environment and by combined effort construct slide presentation showing man destroying his environment both short term and long term. The student will narrate his own presentation. 2. Students can construct a community survey asking questions concerning actions which have taken place in the community which have resulted in local degradation of the environment.

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lide

Resource and Reference Materials

Continued and Additional Suggest

Publications:

Photography magazines in library.

Audio-Visual:

Movie: The Gifts, Dept. of
Int.-Project I-C-E

Filmstrips on ecology and
environment available in
most schools to use as a
guide to a slide series.

Community:

School AV man can come in
illustrate how a slide
series is constructed.

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Continued and Additional Suggested Learning Experiences

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Discipline Area S

Subject I

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> Individual students will investigate the rights of property owners vs rights of non-property owners to share in the resources of our environment & formulate a code of ethics the land owners could use in harmony with each other.</p> <p><u>Affective:</u> The students will recommend all Americans to share in harmony our environment while at the same time share the responsibility for the improvement of this environment.</p>	<p>I. Student-Centered in class activity</p> <p>A. Scientific Investigation</p> <ol style="list-style-type: none"> 1. List the rights of property owners. 2. List the rights of sportsmen & other non-property owners. 3. Weigh pros & cons of both sides of issue & each student should formulate Codes of Ethics which they believe both the landowner & non-landowners could use in harmony & share in our resources.
<p><u>Skills to be Learned</u></p> <p>Knowledge of problems between landowners & non-landowners</p> <p>Ability to compromise on divergent land uses</p> <p>Ability to conduct investigative interviews without prejudice</p>	

ate ownership must be

as a stewardship and

Discipline Area Science

ot encroach upon or violate

Subject

Life Science

vidual right of others.

Problem Orientation Ownership

Grade 7

THEORAL OBJECTIVES

Individual
will investigate
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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A. Scientific Investigation
1. List the rights of property owners.
 2. List the rights of sportsmen & other non-property owners.
 3. Weigh pros & cons of both sides of issue & each student should formulate Codes of Ethics which they believe both the landowner & non-landowners could use in harmony & share in our resources.

- II. Outside Resource and Community Activities
- A. Out of class activities
1. Investigate local laws on trespassing & local problems in this area that law enforcement officers contend with.
 2. Investigate local problems of posting of lands.
 - a. Reasons (Interviews with farmers)
 - b. Effects on sportsmen etc.

be Learned

of problems
landowners &
owners
o compromise on
t land uses
o conduct
gative interviews
prejudice

Resources and Reference Materials

Continued and Additional Suggested Lea

Publications:

Natural Partnerships, The Story
of Symbiosis, Dorothy Shuttlesworth
Sportsman's magazines & publications

Audio-Visual:

Community:

Local farmers
Local Lakeshore property owners
Local sportsman
Area game wardens
Local law enforcement officers
State Dept. of Natural Resources

Materials

Continued and Additional Suggested Learning Experiences

History
Colesworth
Applications

ners

ers
ources

Episode Evaluation Form
(Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish to use the following format. Please feel free to adapt it and add more pages. Let comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials
(specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

ting on each episode used in your class, you may wish to duplicate this suggested
ase feel free to adapt it and add more pages. Let us know all your critiques and
egative and positive.

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Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

ED055918

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 8

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338

Robert War
Robert Kel
George How

- C - E

INSTRUCTION - CURRICULUM - ENVIRONMENT

SECONDARY PROGRAM FOR ENVIRONMENTAL EDUCATION

AREA Science GRADE 8

Under Title III E.S.E.A.

C-E

Schools in CESA's 3-8-9

Street

Wisconsin 54301

4338

Robert Waspinski, Director
Robert Wilner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is ready for over a hundred teachers, year long meetings, a summer workshop, and ecologists, this guide means realistic, developed aid for you. Please read which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are designed--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your students to adapt, adopt, or use. By design, the range of suggestions is wide and implementation and usage are even wider. Many episodes are self-contained; others can be changed in part or developed more keenly over a few possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning experience plan. The reasons are simple. No guide has all the answers and no unless viewed in the context of your classroom situation. Thus, be sure to give it a triple reading, check over the resources listed, make me prime your students, and seek help. The Project personnel and teaching knowledge page stand ready to aid your efforts. Feel free to ask.
4. The Project Resource Materials Center serves all CESA 3, 8, and 9 schools. We will send available materials pre-paid. Call for any help or visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library for Center materials. Please offer suggestions, comments, or advice--a service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch ideas and suggestions on the episode pages or use the attached evaluation form collected in late May next year and will be used in our revisions. We welcome reactions and suggestions--negative and positive. Please note that in the episodes may refer to specific, local community resources or cases, individual school districts and teachers will have to adopt substitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--survival--Creation's beauty and complexity--often noted as the work of a generation and human energy to save. A year's work by a hundred of your fellow ecologists. Without you, their work will crumble, and so might we all. Let us live to think, feel, and act in harmony with our world.

Editorial

1. Cognitive means a measurable mental skill, ability, or process
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Accceptable Performance Will Include (labels a cognitive)
4. EPA - Environmental Problem Area

PREFACE

ite students about their environment, help is ready. Thanks to the efforts teachers, year long meetings, a summer workshop, university consultants and aid means realistic, developed aid for you. Please note the following ideas teachers in writing and editing this guide.

Complementary in nature and the episodes are designed--at appropriate instances--to existing, logical course content.

Episode offers suggestions. Since you know your students best, you decide what to use. By design, the range of suggestions is wide; your chances for experience are even wider. Many episodes are self-contained, others open-ended, still changed in part or developed more keenly over a few weeks. These built-in allow you to explore.

you try the episodes and suggested learning experiences but please pre-pare are simple. No guide has all the answers and no curriculum will work in the context of your classroom situation. Thus, before trying an episode, reading, check over the resources listed, make mental and actual notes, questions, and seek help. The Project personnel and teachers listed on the acknowledgments stand ready to aid your efforts. Feel free to ask their help in pre-planning. Resource Materials Center serves all CESA 3, 8, and 9 area schools--public and private--and send available materials pre-paid. Call for any help, materials, or to 4338.

Project ICE Bibliography in your school library for available Resource Materials. Please offer suggestions, comments, or advice--at any time--so that this project can help each other.

With the guide by reacting to it with scratch ideas, notes, and extended responses on the episode pages or use the attached evaluation format, which will be collected next year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed may refer to specific, local community resources or conditions. In such cases, school districts and teachers will have to adopt local or available substitutes. A list of terms pertinent to the episodes is below.

Other experts have simplified the issue--survival--yours, mine, our students, and complexity--often noted as the work of a genius--will take our genius to save. A year's work by a hundred of your fellow teachers is a saving grace for you, their work will crumble, and so might we all--literally. Instead, think, feel and act in harmony with our world.

Editorial Board

is a measurable mental skill, ability, or process based on factual data. It is not based on student attitudes, values, and feelings.

Acceptable Performance Will Include (labels a cognitive or mental performance.)
Mental Problem Area

ACKNOWLEDGEMENTS: The following teachers and consultants participated in the development of the Supplementary Environmental Education Curriculum.

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 , Pembine William Bohne, Kimberly
 Cconto Bob Church, Little Chute
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 White Lake Clarence Trentlage, Freedom
 hite Lake Mike Hawkins, Xavier
 Beth Hawkins, Xavier
 tt Ed Patschke, Menasha
 llett Connie Peterson, St. Martin (L)
 Dallas Werner, Kaukauna
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 Gloria Morgan, Linsmeier Private
 George Pederson, Southern Door
 Alan Schuh, Pulaski
 Thomas Weyers, Cathedral
 Ruth Windmuller, Green Bay
 James Wiza, DePere
 John Torgerson, Kewaunee
 Benjamin Roloff, Howard-Suamico
 Greg Schmitt, Cathedral
 John DeWan, Green Bay
 Emmajeane Harman, Sevastopol
 Ray Gantenbein, Green Bay
 David Bartz, Sturgeon Bay
 John Hussey, Green Bay
 Sister Barbara, St. Bernard

Robert Cook, UWGB
 Dennis Bryan, UWGB

C 1. Energy from the sun, the basic
 O
 N source of all energy, is converted
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 E through plant photosynthesis into a
 P
 T form all living things can use for
life processes.

Discipline Area
 Subject
 Problem Orientation

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> To be able to explain, (written or oral), how the sun's energy draws capillary water into plants to accomplish photosynthesis.</p> <p><u>Affective:</u> The student will suggest from these activities that all living things are dependent on the sun's energy.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Show film - <u>Ground Water</u>. 2. Read - Modern Earth Science, p. 269-271. 3. Investigate - Growing plants in sunlight, in darkness and test for transpiration. Show oxygen content of water and over-population of animals. Show balance of plant and animal life. 4. Show effects in winter of plant-animal relation with respect to oxygen content and ice and snow cover. 5. Show early spring and summer conditions of water. 6. Set up local balanced pond, make year-round study. Set up variable and control conditions.
<p><u>Skills to be Learned</u></p> <p>Investigative skills Setting up of studies Writing an evaluation of information.</p>	

from the sun, the basic

all energy, is converted

plant photosynthesis into a

living things can use for
processes.

Discipline Area

Science

Subject

Earth Science

Problem Orientation E.P.A. Energy Grade 8

ORAL OBJECTIVES

To be able to ex-
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in
class activity

1. Show film - Ground
Water.

2. Read - Modern Earth
Science, p. 269-271.

3. Investigate - Growing
plants in sunlight, in
darkness and test for
transpiration.

Show oxygen content of
water and over-popula-
tion of animals.

Show balance of plant
and animal life.

4. Show effects in win-
ter of plant-animal
relation with respect
to oxygen content and
ice and snow cover.

5. Show early spring
and summer conditions
of water.

6. Set up local bal-
anced pond, make year-
round study. Set up
variable and control
conditions.

II. Outside Resource and
Community Activities

1. Take field trip....

a) show moisture in the
soil in selected areas,
shaded, open, semi-open.
b) report on moisture
content in selected
kinds of soil.

2. Investigation... Show
with local water areas
plant and animal re-
lations.

3. Local game management
personnel.

4. Biologists from
industry and universi-
ties.

Publications:

Modern Earth Science, c.1969
Holt, Rinehart and Winston,
pp. 269-271.

Audio-Visual:

Film "Ground Water" - 10 min.
Encyclopedia Britannica Films, Inc.

Community:

Field Trip to any suitable
piece of land.
Local game management personnel
Biologists from industry and
universities

Reference Materials

Continued and Additional Suggested Learning Experiences

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d Winston,

" - 10 min.
tanica Films, Inc.

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C 1. Energy from the sun, the basic source
 O
 N of all energy, is converted through plant
 C
 E photosynthesis into a form all living
 P
 T things can use for life processes.

Discipline Area

Subject

Problem Orientation

BEHAVIORAL OBJECTIVES

Cognitive: The students construct a funnel with plant life in different conditions to show energy transfer of sunlight. Then they will record data and make hypothesis in a notebook.
Affective: The student will defend that there is a balance of nature and transfer of energy between living organisms.

Skills to be Developed

To develop some proficiency in experiments and investigations

To be able to evaluate information

To be able to write and show with graphs, information.

SUGGESTED LEARNING ACTIVITIES

- I. Student-Centered in class activity
 1. Filmstrip - Atmosphere and Its Circulation.
 2. Readings - Modern Earth Science.
 3. Investigation - Activities for Modern Earth Science Investigation 20-1
 4. Use of the investigation of respiration in plants through the study of plants with:
 - a) Study of the plant cell.
 - 1) Structure of the cell with diagrams.
 - 2) Observation of cell with microscope with:
 - a) onion skin
 - b) apple skin
 - c) true leaf
 - d) flower or weed leaf
 - b) Growth of water plants and the collection of oxygen in a test tube.

(cont.)

ESEA Title III - 59-70-0135-1 Project I-C-E

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Discipline Area

Science

Subject

Earth Science

Problem Orientation

Energy

Grade 8

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

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 - b) apple skin
 - c) true leaf
 - d) flower or weed leaf
 - b) Growth of water plants and the collection of oxygen in a test tube.

(cont.)

- II. Outside Resource and Community Activities

Resource and Reference Materials

Publications:

Modern Earth Science, c.1969
Holt, Rinehart & Winston, pp. 408-415.

Activities for Modern Earth Science,
Holt, Rinehart, and Winston
Investigation 20-1 - Earth's Atmosphere

Introduction to the Atmosphere,
McGraw-Hill, 1963

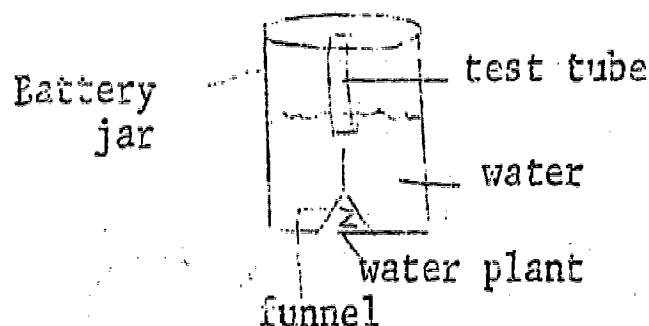
Audio-Visual:

Filmstrip - Atmosphere and Its Circulation

Encyclopedia Britannica, Inc.

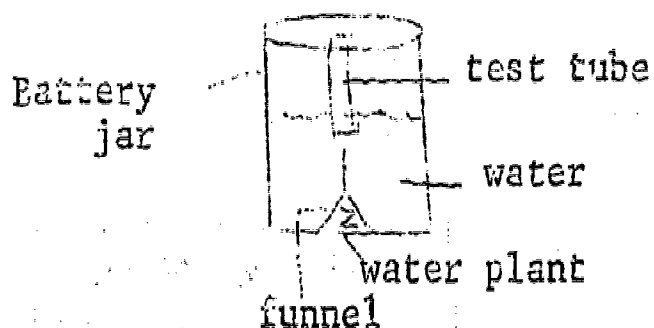
Community:

Continued and Additional Suggested Learning Activities



Allow the plant to remain in the jar for 24 hours.
After this time, remove the test tube and measure the oxygen content with a glowing splint.

Continued and Additional Suggested Learning Experiences



Allow the plant to remain in the funnel for 24 hours. After this time, remove the test tube and test the oxygen content with a glowing splinter of wood.

C 2. All living organisms interact among
 O
 N themselves and their environment,
 C
 E forming an intricate unit called
 P
 T an ecosystem.

Discipline Area _____ Sc
 Subject _____ Ea
 Problem Orientation _____ Eco

BEHAVIORAL OBJECTIVES

Cognitive: Each student will be able to draw & explain data concerning the interactions of an ecosystem and orally explain or write conclusions arrived at from observations relating to the interactions of an ecosystem.

Affective: The student will obtain a realistic and positive attitude concerning the balance of nature in an ecosystem*

Skills to be Learned

Accumulation of data and organization of it.

Discussion of the interactions of an ecosystem.

*Investigate the careful balance of nature within a controlled environment (Aquarium) & evaluate individual factors in respect to this total scheme.

SUGGESTED LEARNING

I. Student-Centered in class activity

1. Balance the living things in the aquarium-plant life and animal life.

2. Conduct tests for oxygen content, carbon dioxide, & changing conditions for heat & light.

3. Change one variable of the aquarium.

a. Over amount of plant life

b. Over population of animal life

c. Lack of light/constant light

d. Change of temperature

4. Observe aquarium

a. Results of change in variables.

b. Record data

c. Make charts & graphs

d. Make diagrams showing results of observations.

5. Collection of local pond water containing algae and zooplankton.

II.

ESEA Title III - 59-70-0135-1 Project I-C-E

organisms interact among

d their environment,

Discipline Area Science

tricate unit called

Subject Earth Science

Problem Orientation Ecosystem Grade 8

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
h student draw & ex- plaining the an eco- ly explain sions arrived tions relating ions of student realistic titude con- ance of cosystem?	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none">1. Balance the living things in the aquarium-plant life and animal life.2. Conduct tests for oxygen content, carbon dioxide, & changing conditions for heat & light.3. Change one variable of the aquarium.<ol style="list-style-type: none">a. Over amount of plant lifeb. Over population of animal lifec. Lack of light/constant lightd. Change of temperature4. Observe aquarium<ol style="list-style-type: none">a. Results of change in variables.b. Record datac. Make charts & graphsd. Make diagrams showing results of observations.5. Collection of local pond water containing algae and zooplanktan.	<p>II. Outside Resource and Community Activities</p> <ol style="list-style-type: none">1. Check local ponds & rivers for:<ol style="list-style-type: none">a. Possible animal populationb. Plant lifec. Determine oxygen level & carbon dioxide leveld. Checks will be made at different time of year.2. Outside speaker-DNR<ol style="list-style-type: none">a. Fish managementb. Local game wardenc. Local personnel from University working in water management.3. Field trips<ol style="list-style-type: none">a. fish hatcheryb. fish-holding areas
arned f data and it. the inter- cosystem. e careful re within vironment aluate ors in res- tal scheme.		

Resource and Reference Materials
Publications:

Continued and Additional Suggest

Books:

The Balance of Nature, Miline,
Margery, Alfred A. Knopf, Inc.
New York.

Beginner's Guide to Fresh-Water
Life, L. S. Hausman. G.P.
Putnam's Sons, New York 1958.

Audio-Visual:

Conservation & Balance in Nature,
(color) 18 min.

International Film Bureau
BAVI

Field Trip to a Fish Hatchery,
10 min.

Coronet, BAVI

Plant-Animal Communities:

Ecological Succession (color)
14 min. Coronet, BAVI

Community:

Resource people

Dept. of Natural Resources

Fish hatcheries

ce Materials Continued and Additional Suggested Learning Experiences

e, Miline,
Knopf, Inc.

Fresh-Water
G.P.
York 1958.

e in Nature,

ureau

Hatchery,

es:
(color)

ources

C 3. Environmental factors are limiting
 O
 N on the numbers of organisms living
 C
 E within their influence, thus, each
 P
 T environment has a carrying capacity.

Discipline Area Science
 Subject Earth
 Problem Orientation Can

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Students will gather data concerning climatic regions of the world and the affect of the climate as a limiting factor on the organisms living in that environment. A.P.W.I. organizing the data into a written report showing the relationship of certain organisms with-in a region & why they exist there.</p> <p><u>Affective:</u> The student will question why certain organisms exist in one region as compared to an absence of that organism in another region with different environmental conditions.</p>	<p>I. Student-Centered in class activity</p> <p>A. Study of climatic conditions that influence numbers of organisms.</p> <ol style="list-style-type: none"> Study of climate in regions: <ol style="list-style-type: none"> Desert regions Tundra regions Mediterranean regions Equatorial regions Organisms within a region: <ol style="list-style-type: none"> Students will select a region that they will study. Students will in some way through the use of charts, graphs, drawings, oral & written reports organize a report showing organisms within a region. Student results of research should show: <ol style="list-style-type: none"> Main types of certain organisms (Ex.-Types of mammals). Reasons for types of organisms. How environmental conditions influence an organisms habitate.
<p><u>Skills to be Learned</u></p> <p>Research of subject matter</p> <p>Construction of graphs and charts</p> <p>Organization of material</p> <p>Presentation of research material (written & oral)</p>	

mental factors are limiting

ers of organisms living

Discipline Area Science

r influence, thus, each

Subject

Earth Science

has a carrying capacity.

Problem Orientation

Carrying

Capacity

Grade 8

GENERAL OBJECTIVES

Students will
concerning
ons of the
e affect of
as a limiting
e organisms
at environment.
anizing the
written report
relationship
organisms with-
why they

The student
why certain
st in one
pared to an
at organism
region with
environmental

Learned
subject

of graphs

of material
of research
ritten & oral)

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Study of climatic conditions
that influence numbers of
organisms.

1. Study of climate in regions:

- Desert regions
- Tundra regions
- Mediterranean regions
- Equatorial regions

2. Organisms within a region:

- Students will select a
region that they will
study.
- Students will in some
way through the use of
charts, graphs, drawings,
oral & written reports
organize a report showing
organisms within a region.
- Student results of
research should show:

- Main types of certain
organisms (Ex.-Types
of mammals).
- Reasons for types of
organisms.
- How environmental
conditions influence an
organisms habitate.

II. Outside Resource and
Community Activities

A. Outside class activity

- Local climate condi-
tions would be studied.
- Students would select
organisms of their
local to observe.
- Plants of different
regions could be
compared with similar
plants of the local.
- Adaptations that
would have to be made
by animals of local
area with similar
animals from different
regions.
- How organisms of our
area adapt to our
climate in order to
survive.

B. Resource Material

- Write to Embassy of
a country for infor-
mation.
- Write to the interior
department of different
countries.

Resource and Reference Materials

Publications:

Desert Dwellers, Plants & Animals

21 min. Color

Coronet BAVI

Continued and Additional Suggeste

Audio-Visual:

Community:

Local game management
personnel

Faculty members of Universities
familiar with regions of the
world

Possible exchange students from
a region studied

nce Materials

Continued and Additional Suggested Learning Experiences

nts & Animals

universities
ns of the

udents from

C
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T

4. An adequate supply of pure water
is essential for life.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: Each student will be able to draw and explain, orally or written, the water cycle.

Affective: The student will accept or reject the need to have knowledge about the operation and significance of the hydrologic cycle.

Skills to be Learned

Accumulating data and organization of this.

Discussion of man's use and misuse of water

SUGGESTED LEARNING

- I. Student-Centered in class activity
 1. Show film - "The Water Cycle"
 2. Read - Modern Earth Science, p. 256-259.
 3. Data Analysis -
 - a) graphs of water use-age and projections
 - b) maps showing drainage (flood plains) by water areas (rivers, lakes, streams, etc.)
 - c) drawings of water recycling in city treatment plant
 - d) research papers on water conditions relating to pollution and possible solutions.

adequate supply of pure water
essential for life.

Discipline Area

Science

Subject

Earth Science

Problem Orientation E.P.A. Water Grade 8

BEHAVIORAL OBJECTIVES

1. Each student will
be able to draw and explain,
in written, the water

2. The student will
be able to reject the need
for knowledge about the
importance and significance
of hydrologic cycle.

3. To be Learned

4. Relating data and
information of this.

5. Evaluation of man's use
of water

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in
class activity

1. Show film - "The
Water Cycle"

2. Read - Modern Earth
Science, p. 256-259.

3. Data Analysis -

a) graphs of water use-
age and projections

b) maps showing drainage
(flood plains) by water
areas (rivers, lakes,
streams, etc.)

c) drawings of water
recycling in city treat-
ment plant

d) research papers on
water conditions re-
lating to pollution
and possible solutions.

II. Outside Resource and
Community Activities

1. Field Trip - water
purification plant. Local
water sources; investi-
gation of local and state
rivers for chemical
analysis; general pollu-
tion; Water Dept. for
water useage--past,
present, future.

2. Local Water Dept.
officials.

3. Dept. of Natural
Resources.

Resource and Reference Materials	Continued and Additional Suggest
<p><u>Publications:</u></p> <p><u>Modern Earth Science</u>, c 1969, Holt, Rinehart, Winston, pp. 256-259.</p> <p><u>The Sea Around Us</u> Excerpts on water's birth</p> <p><u>Audio-Visual:</u></p> <p>"The Water Cycle", 10 min. Encyclopedia Britannica Films, Inc.</p> <p><u>Community:</u></p> <p>Field trip to any suitable piece of land</p>	

Materials

Continued and Additional Suggested Learning Experiences

1969,
n, pp. 256-

erth

in.
a Films, Inc.

ble piece of

C 5. An adequate supply of clean air is
 O
 N essential because most organisms
 C
 E depend on oxygen, through respiration,
 P
 T to release the energy in their food.

Discipline Area Science

Subject Science

Problem Orientation Problem

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> Student will be able to name ways in which air pollution affects energy release in respiration.</p> <p><u>Affective:</u> By investigating the relationship of respiratory activities to air supply, the student will develop positive values for clean air.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Students test foods for nutrient components. <ol style="list-style-type: none"> a. Benedict solution test for reducing sugars (does not work on sucrose sugar). b. Iodine test for starch c. Have students chew some crackers after testing for sugar & starch. Allow material to stand in beaker for 10 min. after impregnated with saliva. Test again for sugars. d. Students should relate role of saliva to starch digestion releasing sugar for cellular respiration 2. Teacher demonstrates energy potential of sucrose sugar (table sugar) by combining a small amount of sulfuric acid with ca. 100g of sugar. Observe temperature before & during the reaction. Use caution while working with acid. Students observe reaction & describe. Students can infer that heat (cont
<p><u>Skills to be Learned</u></p> <p>Observation Data collection Inferring Laboratory procedure</p>	

adequate supply of clean air is

because most organisms

Discipline Area Science

oxygen, through respiration, Subject

Science - Life Science

the energy in their food.

Problem Orientation Respiration Grade 8

GENERAL OBJECTIVES

Student will
name ways in
which pollution
affects oxygen release
from plants.
By investigating
relationship of respira-
tion to air
pollution, student will
determine relative values
of air quality.

Learned

tion
procedure

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Classroom

1. Students test foods for
nutrient components.
 - a. Benedict solution test
for reducing sugars
(does not work on sucrose
sugar).

- b. Iodine test for starch.
 - c. Have students chew some
crackers after testing
for sugar & starch. Allow
material to stand in
beaker for 10 min. after
impregnated with saliva.
Test again for sugars.

- d. Students should relate
role of saliva to starch
digestion releasing sugar
for cellular respiration.

2. Teacher demonstrates energy
potential of sucrose sugar
(table sugar) by combining
a small amount of sulfuric
acid with ca. 100g of sugar.
Observe temperature before
& during the reaction. Use
caution while working with
acid. Students observe
reaction & describe. Student
can infer that heat (cont.)

II. Outside Resource and
Community Activities

A. Outside activity

1. Field trips to
different areas
looking for pollution
of the air.
2. Take pictures of
this.
3. Discuss how these
pollutants affect
respiration.

Resource and Reference Materials

Publications:

BSCS Green Version High School
Biology/Lab Section
Animal/Human Physiology
Lab/Manuals
Standard Biology & Physiology
texts with chapters on
Respiration

Audio-Visual:

Poisoned Air, BAVI, 6777
Air Pollution, BAVI, 0678
Model of respiratory system
Tissue slides of good lung &
diseased lung

Community:

Local hospital

Continued and Additional Suggested I

I. (cont.)

released comes from breakdown of
release of bonding energy.

3. Respiration

- Show diagram of the lungs.
- Show how the circulatory system
- Discover why oxygen has to
- Light a fire in a pan. Discover
easily.
- Light another fire. Eliminate
- Discover why the fire goes
- Show that there is a connection
or combustion release & the
food.

249

C 6. Natural resources are not equally

O

N distributed over the earth or over

C

E time and greatly affect the geographic

P

T conditions and quality of life.

Discipline Area

Science

Subject

Earth Sci

Problem Orientation

Natural

Resources

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

Cognitive: Each student will draw and explain, orally or in writing, the petrologic cycle.
Affective: Through the analysis of data, the student will praise the intricacies of how the basic types of rocks come into existence.

- I. Student-Centered in class activity
 1. Filmstrip: How Are Rocks Made.
 2. Readings: Modern Earth Science.

- II. Outside the classroom
 1. Field trip: How Are Rocks Made.
 2. Analysis of data
 - a. ...
 - b. ...
 3. Out of class
 - a. ...
 - b. ...

Skills to be Learned

- Accumulating comparative data
- Analysis of rock formations in respect to environmental conditions
- Illustrating cycles concretely

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he earth or over

Discipline Area

Science

ffect the geographic

Subject

Earth Science

lity of life.

Problem Orientation

Natural

Resources

Grade

8

CTIVES

SUGGESTED LEARNING EXPERIENCES

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s come

- I. Student-Centered in class activity
1. Filmstrip: How Are Rocks Made.
 2. Readings: Modern Earth Science.

- II. Outside Resource and Community Activities
1. Fieldtrip to Kettle Moraine - Baraboo - Wisconsin Dells, etc.
 - a. Local land conditions
 - b. Soil test for acidity, drainage
 2. Analysis of data
 - a. Maps of rock layers
 - b. Graphs - drainage comparison
 3. Outside Resource
 - a. Geologist from local university
 - b. Person from Department of Natural Resources

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orma-
environ-

s con-

Resource and Reference Materials
Publications:

Continued and Additional Suggested

Modern Earth Science, Holt,
Rinehart, Winston, 1969, pp. 169-81
The Sea Around Us, R. Carsen
excerpts on earth's beginnings.

Audio-Visual:

How Are Rocks Made, filmstrip,
Encyclopedia Britannica Film, Inc.

Community:

field trip to any suitable
piece of land

Reference Materials	Continued and Additional Suggested Learning Experiences
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Holt,
1969, pp. 169-81
Carsen
beginnings.

Filmstrip,
Kodak Film, Inc.

table

C 6. Natural resources are not equally

O

N distributed over the earth or over

C

E time and greatly affect the geographic

P

T conditions and quality of life.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: This activity will show in a humorous way that all resources are not found all over the earth. The students will know by each article where they are not likely to find certain resources. Each student after the discussion should know where & how each resource originated & where it is found.

Affective: By observing the students' proposals for conservation & recommendations, we can evaluate his feelings about this concept during a post-activity discussion.

Skills to be Learned

Use of library for materials
Trying out other sources not used before, such as clubs & societies & their publications.
Humorous & brief article of the newspaper variety
Use of community resources

SUGGESTED LEARNING

- I. Student-Centered in class activity
"Impossible Times Newspaper" written by students.
1. Not-likely-to-happen headlines & short newspaper article concerning some locality such as:
 - "Oil Struck in Green Bay"
 - "Oconto Falls Harvests First Orange Crop"
 - "Plants & Shrubs Buried 10 Years Ago Are Being Dug To As Coal"
 - "Palm Beach Holds Annual Smartphone Derby Tomorrow"
2. Put all articles on a large sheet of paper & hang on board.
3. Discuss why each is humorous & relate to the origin of the resource. Each student must be able to tell origin of his article.
4. Suggested areas to work on for each "paper."
 - a. Fossil fuels
 - b. Ores, minerals
 - c. Wildlife
 - d. Water
 - e. recreation & natural resources
 - f. forests

resources are not equally

over the earth or over

Discipline Area

Science

greatly affect the geographic Subject

Earth Science

and quality of life.

Problem Orientation

Natural

Resources

Grade 8-9

AL OBJECTIVES

This activity
a humorous way
resources are not
the earth.
will know by
where they
to find
ces. Each
the discus-
now where &
ource origi-
it is found.
observing
proposals
on & recom-
can evalu-
gs about
uring a
discussion.

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by for materials
her sources not
uch as clubs &
eir publications.
ief article
er variety
ity resources

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

"Impossible Times Newspaper"
written by students.

1. Not-likely-to-happen head-
lines & short newspaper art-
icle concerning some locality,
such as:

"Oil Struck in Green Bay"

"Oconto Falls Harvests First
Orange Crop"

"Plants & Shrubs Buried 10
Years Ago Are Being Dug Today
As Coal"

"Palm Beach Holds Annual Snow-
mobile Derby Tomorrow"

2. Put all articles on a large
sheet of paper & hang on board.

3. Discuss why each is humorous
& relate to the origin of the
resource. Each student must be
able to tell origin of his
article.

4. Suggested areas to work on
for each "paper."

a. Fossil fuels

b. Ores, minerals

c. Wildlife

d. Water

e. recreation & natural resources

f. forests

II. Outside Resource and
Community Activities

Resource and Reference Materials
Publications:

Environmental Education Materials,
Nos. 33/34 pg. 40-49, Earth
Science texts.

Continued and Additional Suggested I

Audio-Visual:

Films:

Our Vanishing Land, color,
16 min. McGraw-Hill.

Our Part in Conservation,
McGraw-Hill.

Community:

library

Geology Club

museum

oil companies

U. S. Forest Service

rials

Continued and Additional Suggested Learning Experiences

rials,

ESEA Title III - 59-70-0135-1 Project I-C-E

C 6. Natural resources are not equally
 O
 N distributed over the earth or over Discipline Area _____
 C
 E time and greatly affect the geographic Subject _____
 P
 T conditions and quality of life. Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> The students will express orally & with charts and graphs the affects of natural resources in the form of fuels on our daily lives.</p> <p><u>Affective:</u> The student will suggest that the available power sources are rapidly depleting & promote that a substitute must be found. This substitute must fulfill future needs but must also be relatively pollution-free.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Develop a comparative chart showing usage of energy sources at present rates & at rates of ten years ago. Concentrate on <u>coal</u>, <u>petroleum</u>, <u>natural gas</u>, <u>atomic energy</u>, <u>solar energy</u>. 2. Develop a comparative chart showing availability of the above energy sources now & ten years ago. 3. Project future needs based upon projections of populations & industrial growth & recommend replacements for those fuels which are in danger of complete depletion.
<p><u>Skills to be Learned</u></p> <ul style="list-style-type: none"> Accumulating comparative data Analysis of statistical data Discussion of environmental effects of power sources 	

resources are not equally

over the earth or over

Discipline Area

Science

greatly affect the geographic

Subject

Earth Science

and quality of life.

Problem Orientation

Natural

Resources

Grade

8

AL OBJECTIVES

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Learned
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f environ-
s of power

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Develop a comparative chart showing usage of energy sources at present rates & at rates of ten years ago. Concentrate on coal, petroleum, natural gas, atomic energy, solar energy.
2. Develop a comparative chart showing availability of the above energy sources now & ten years ago.
3. Project future needs based upon projections of populations & industrial growth & recommend replacements for those fuels which are in danger of complete depletion.

II. Outside Resource and Community Activities

1. Panel discussion with guest speakers and students.
 - a. Discussion research based upon comparative study & additional research pertaining to fuel-source pollution potentials.
2. Class visit to nearby power plant.
 - a. Emphasis on pro - con of nuclear power
 - b. Do present gains of nuclear power outweigh potential pollution problems?

Resource and Reference Materials
Publications:

Continued and Additional Suggeste

Earth Science, Brown, Kemper, Lewis,
Silver Burdett Company, Morristown,
N. J., 1970, 566p.

The Earth: Its Changing Form. Beck,
P.F., Strahler, A.D., Harcourt,
Brace, & World, 1970, 598p.

Conservation, American Petroleum
Institute, School Programs, 1271
Avenue of the Americas, N. Y.,
N. Y. 10020, 1970.

30 Basic Speech Experiences, Clark
Publishing Co.

Audio-Visual:

Community:

Materials

Continued and Additional Suggested Learning Experiences

emper, Lewis,
, Morristown,

Form. Beck,
Harcourt,
598p.
Petroleum
grams, 1271
, N. Y.,

ences, Clark

C 7. Factors such as facilitating transportation,
 O
 N economic conditions, population growth, Discipline area Science
 C
 E and-increased leisure time have a great Subject Earth
 P
 T influence on changes in land use and Problem Orientation La
 centers of population density.

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EX

Cognitive: The students will research their area by analyzing the soil, water, air, and geographical features to discover how they influenced the land use.
Affective: Students will attempt to show that land conditions determine their use and influence where people live in relation to this.

I. Student Centered in class activity

II. Ou

A. Research on Land Use of the Area

Com

1. Use for recreation

A.

2. Use for roads

as

3. Residential uses

in

4. Commercial and industrial use

1.

5. Food growing

2.

6. Use research material to show increase in the last 20 years

3.

a. How the land area uses have changed

4.

b. How food production has increased; reasons for increased production

B.

B. Population research

in

1. Change of population centers.

to

a. Land use changes

co

from farming to residential and commercial/industrial use.

1.

b. Access from rural to urban areas with road building.

a

c. Soil depletion and land clearing.

b

(cont.)

Skills to be Learned

Collecting data

Organization of materials

Map making

Graphs and diagrams

Project I-C-E

ESEA Title III - 59-70-0135-1

as facilitating transportation,

tions, population growth, Discipline area Science

leisure time have a great Subject Earth Science

changes in land use and Problem Orientation Land Use Grade 8
ulation density.

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Students will area by il, water, hical fea- r how they and use. nts will that land mine their e where elation to	I. Student Centered in class activity A. Research on Land Use of the Area 1. Use for recreation 2. Use for roads 3. Residential uses 4. Commercial and industrial use 5. Food growing 6. Use research material to show increase in the last 20 years a. How the land area uses have changed b. How food production has increased; reasons for increased production B. Population research 1. Change of population centers. a. Land use changes from farming to residential and commercial/industrial use. b. Access from rural to urban areas with road building. c. Soil depletion and land clearing.	II. Outside Resource and Community Activities A. Students will select one aspect of the area to investigate such as: 1. Soil 2. Geological features 3. Air 4. Water B. Each aspect of the area investigated will relate to the effects on the community such as: 1. Population changes a. Industry b. Food related and producing C. Resource people 1. Local agriculture agent 2. Water and air quality expert from the state dept. 3. Dept. of Natural Resources 4. Personnel from local university familiar with local land formations.

(cont.)

Resource and Reference Materials

Publications:

Asimov, Isaac. Building Blocks of the Universe. Abelard-Schuman, Ltd., New York. 1957

Asimov, Isaac. The Search for the Elements. Basic Books, Inc., New York. 1962

Meyer, Jerome S. The Elements: Builders of the Universe. World Publishing Co., New York. 1957

Kane, Henry B. The Tale of a Meadow. Alfred A. Knopf, Inc., New York. 1959

Watts, Mary T. Reading the Landscape: An Adventure in Ecology. The Macmillan Co, New York. 1957

Stallings, J.H. Soil: Use and Improvement. Prentice-Hall Inc., Englewood Cliffs, N.J. 1957

Williams-Ellis, Annabel. Man and the Good Earth. G.P. Putnam & Sons, New York. 1959

Audio-Visual:

-Conserving our Soil Today

11 min. Coronet 1960

Environmental Studies - BAVI

-Heritage We Guard

31 min. USDA 1940

Environmental Studies - BAVI

*-Masters of the Soil

23 min. Ethyl 1948

Environmental Studies - BAVI

-Man Uses and Changes the Land

11 min. Coronet 1967

Environmental Studies - BAVI

Community:

Continued and Additional Su

Student-Centered in class ac

C. Research on land, air, w

1. Land (Soil)

a. Mineral conditions

b. Soil types

c. Plant growth in type

d. Soil conditioning

2. Air

a. Pollutants

i. Industrial ii. Natu

3. Water

a. Rainfall b. Run-off

d. Rivers, streams, lak

4. Geological conditions

a. Natural land feature

i. Valley ii. Hills iii

(red rock, types of

D. Research

1. Investigate and observ

2. Investigate minerals a

3. Use soil testing kits

4. Use water analysis and

5. Rock samples for ident

6. Students keep data on

7. Make graphs and charts

8. Use diagrams for soil

9. Students make oral and

Materials

Continued and Additional Suggested Learning Experiences

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e Landscape:

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, Englewood

Man and the

& Sons,

Student-Centered in class activity (cont.)

C. Research on land, air, water, geological conditions

1. Land (Soil)

- a. Mineral conditions
- b. Soil types
- c. Plant growth in types of soil
- d. Soil conditioning

2. Air

- a. Pollutants
- i. Industrial
 - ii. Natural
 - iii. Sanitary burning

3. Water

- a. Rainfall
- b. Run-off
- c. Ground water
- d. Rivers, streams, lakes (pollution of)

4. Geological conditions

- a. Natural land features
 - i. Valley
 - ii. Hills
 - iii. Plains
 - iv. Rock formations
- (red rock, types of rocks, soil depth)

D. Research

1. Investigate and observe types of rocks and soils
2. Investigate minerals and their concentration in soils.
3. Use soil testing kits for evaluation
4. Use water analysis and air quality kits.
5. Rock samples for identification.
6. Students keep data on investigations
7. Make graphs and charts of data.
8. Use diagrams for soil layers and land formations.
9. Students make oral and written presentations

AVI

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AVI

Land

AVI

C 8. Cultural, economic, social, and
O political factors determine status
C of man's values and attitudes
P toward his environment.

Discipline Area Science
Subject Science
Problem Orientation Pollution

BEHAVIORAL OBJECTIVES

Cognitive: The student will be able to orally communicate the evaluation of and processes needed to implement environmental change.
Affective: Students will demonstrate their awareness of the changes needed to improve environmental problems by listing needs of their area in the order of priorities.

Skills to be Learned

Research
Organization of data
Presentation of material
Interviewing resource people
Making graphic displays
Collecting data

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
1. Have students do research on the costs of/or the money being spent on the areas of land, water, and air improvement. (local level)
2. May build displays on how this is being done.
3. Depending upon class size group work on the displays according to student's interest may be done.
4. Information obtained may be presented to the class as a whole with oral presentations.

II. Outside Community
1. Student the local much improvement (Cost people appropriate laws backing needed
2. Group area of the their resources local
3. Group Each case Present Each evaluation of class

Project I-C-E

ESEA Title III - 59-70-0135-1

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determine status

Discipline Area Science

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Subject Science

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Problem Orientation Pollution Grade 8

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SUGGESTED LEARNING EXPERIENCES

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- I. Student-Centered in class activity
1. Have students do research on the costs of/or the money being spent on the areas of land, water, and air improvement. (local level)
 2. May build displays on how this is being done.
 3. Depending upon class size group work on the displays according to student's interest may be done.
 4. Information obtained may be presented to the class as a whole with oral presentations.

- II. Outside Resource and Community Activities
1. Students will go out into the local area & evaluate how much money it would cost for improvements in their areas. (Cost involved, resource people needed, political appropriations needs, new laws passed & how they need backing, scientific resources needed)
 2. Group evaluations of their area (Listing of priorities of their area as needed in their local area, getting in resource people, displays of local problems.)
 3. Group activity as a whole:
Each group will present their case for their interest area. Present their priorities.
Each group's priorities will be evaluated by the class. A list of class priorities will evolve.

Resource and Reference Materials

Publications:

Books:

- The Life of The Green Plant by Arthur Galston, Prentice-Hall.
Plant Life by Lorus Milne and Margery Milne, Prentice-Hall.
The Story of the Plant Kingdom by Merle Coulter & Howard Dittmer.
Conservation in America by Dorothy Hogner.
Soil: Use and Improvement by J. H. Stallings.
Man and the Good Earth by Amabel & Ellis Williams.
Adaptation by Bruce Wallace and Adrain Srle.

Audio-Visual:

Films:

- Bureau of Audio-Visual Instruction
#4546 - Life in a Cubic Foot of Air, Coronet, 1958.
#3255 - Life in the Grasslands, EBF, 1954.
#1723 - Pond Life, EBF, 1950.
#2359 - Vital Earth (This), EBF, 1948.
#2384 - Water Supply, Academy, 1947.
#4816 - Water For Farm and City, USDA, 1959.
#5079 - Conserving our Soil Today, Coronet, 1960.
#2486 - Work of the Atmosphere, EBF, 1935.

Community:

Continued and Additional Suggested Learning

Additional Interdisciplinary Areas: Science

1. Water analysis activities (nutrient flow, temperature changes [causes of water sources, uses of the water effects, organism life.)
2. Land (Soil classification, soil-plant life relation, land for
3. Air (Testing air quality, air and living organisms, causes of pollution)

Social Studies

1. Study of local government - state (Structure - elected & appointed committees, how bills are written)
2. Have students write a bill on a subject arrived at from the list of priorities
3. Role-playing concerning the past. This would follow the procedure for

Math

1. Study of:
 - a. Costs involved in setting up a
 - b. Budgets of local, state, and federal
2. Concepts:
 - a. ratios
 - b. fractions
 - c. decimals
 - d. multiplication, division, subtraction of the above.

Materials	Continued and Additional Suggested Learning Experiences
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Additional Interdisciplinary Areas:

Science

1. Water analysis activities (nutrients, pollutants, flow, temperature changes[causes & effects of], mapping of water sources, uses of the water supply and effects, organism life.)
2. Land (Soil classification, soil testing for acidity, soil plant life relation, land forms.)
3. Air (Testing air quality, air relationship with living organisms, causes of pollution.)

Social Studies

1. Study of local government - state, federal (Structure - elected & appointed officials, authority, committees, how bills are written, how a law is passed).
2. Have students write a bill on an environmental problem arrived at from the list of priorities.
3. Role-playing concerning the passage of this bill. This would follow the procedure studied.

Math

1. Study of:
 - a. Costs involved in setting up of environmental programs
 - b. Budgets of local, state, and federal government.
2. Concepts:
 - a. ratios
 - b. fractions
 - c. decimals
 - d. multiplication, division, subtraction, and addition of the above.

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ESEA Title III - 59-70-0135-1 Project I-C-E

C 9. Man has the ability to manage,
O
N manipulate, and change his
C
E environment.
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Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: Each student will determine good & poor soil management practices through written or oral reports.
Affective: The student will advocate the necessity for the techniques of soil conservation.

Skills to be Learned
Accumulating data
Evaluating
Expressing
Drawing
Comparison

SUGGESTED LEARNING

- I. Student-Centered in class activity
 - A. Classroom
 1. Filmstrip: How Man Destroys Soil can be shown to class
 2. Readings: Modern Earth Science.
 3. Have drawings done of land use in farming, showing good & poor uses.
 4. Use of Stream Table showing
 - a. Soil depletion
 - b. Soil erosion

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Discipline Area Science

Subject Earth Science

Problem Orientation Conservation Grade 8

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A. Classroom
1. Filmstrip: How Man Destroys Soil can be shown to class.
 2. Readings: Modern Earth Science.
 3. Have drawings done of land use in farming, showing good & poor uses.
 4. Use of Stream Table showing
 - a. Soil depletion
 - b. Soil erosion

- II. Outside Resource and Community Activities
- A. Field trip
1. Observe & write about:
 - a. Contour plowed field
 - b. Tilled field
 - c. Strip cropping
 - d. Terracing
 - e. Crop rotation
 - f. Soil testing
 - g. Depletion of soil
 2. Have County Agriculture Agent or State Conservation Warden come to class and give talks regarding the area the class is studying.

Resource and Reference Materials

Publications:

Modern Earth Science, pp. 242-252
Holt, Rinehart & Winston, C. 1969

Audio-Visual:

Filmstrip:

How Man Destroys Soil

Society of Visual Education
Ind 1345 Diversey Parkway,
Chicago, Ill. 60614

Community:

Continued and Additional Suggested Learning

Materials

Continued and Additional Suggested Learning Experiences

242-252
n, C. 1969

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way,

C 10. Short-term economic gains may

N produce long-term environmental

E losses.

P
T

Discipline Area Science

Subject Earth Science

Problem Orientation Conservation

BEHAVIORAL OBJECTIVES

Cognitive: The student will explain in writing or orally, how water & soil loss occurs in areas under over-production & inadequate water & soil controls.

Affective: The student will promote the necessity for & techniques of soil conservation.

Skills to be Learned

Use of stream table
Chemical analysis

Cause & effect

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Film: Erosion: Leveling the Land.

2. Readings: Modern Earth Science, p. 242-252.

3. Investigation: Activities for Modern Earth Science 11-2.

II

economic gains may

term environmental

Discipline Area Science

Subject Earth Science

Problem Orientation Conservation Grade 8

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Classroom

1. Film: Erosion: Leveling
the Land.
2. Readings: Modern Earth
Science, p. 242-252.
3. Investigation: Activities
for Modern Earth Science
11-2.

II. Outside Resource and
Community Activities

A. Field trips:

1. Stream pollution
2. Soil pollution:
 - a. Chemical
 - b. Misuse - poor
management
3. Overproduction
 - a. Plant
 - b. Animal
4. Water table

Resource and Reference Materials

Continued and Additional Suggeste

Publications:

Modern Earth Science, c. 1969,
Holt, Rinehart & Winston,
p. 242-252
Activities for Modern Earth Science,
Erosion & Conservation of Soil 11-2

Audio-Visual:

Film:

Erosion: Leveling the Land,
Encyclopedia Britannica Inc.

Community:

Field trip to any suitable area
showing erosion & erosion control
Local Agricultural Agent
Department of Natural Resources

Materials

Continued and Additional Suggested Learning Experiences

1969,

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Inc.

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C 11. Individual acts, duplicated
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Discipline Area Science
 Subject Earth S
 Problem Orientation Air

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> The student will write a paper or organize a discussion to explain how man has polluted the atmosphere through poor environmental controls.</p> <p><u>Affective:</u> The students will participate in an anti-pollution campaign in their area.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. View filmstrip, <u>Canopy of Air.</u> 2. Read <u>Modern Earth Science</u>, p.p. 412-415, <u>The Unclean Sky.</u> 3. Organize an oral or written presentation on "How man has polluted the atmosphere through poor environmental controls." <p>II.</p>
<p><u>Skills to be Learned</u></p> <p>Learn to use materials for analyzing air</p> <p>Organize a presentation written or oral</p> <p>Cause-effect thinking skill</p>	

individual acts, duplicated
ended, produce significant
mental alterations over time.

Discipline Area Science

Subject Earth Science

Problem Orientation Air Pollution Grade 8

ORAL OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. View filmstrip, Canopy of Air.
2. Read Modern Earth Science, p.p. 412-415, The Unclean Sky.
3. Organize an oral or written presentation on "How man has polluted the atmosphere through poor environmental controls."

II. Outside Resource and Community Activities

1. Field trip to show examples of smoke pollution, smoke abatement, and other air pollutants such as automobiles and chemicals.

Resource and Reference Materials
Publications:

Modern Earth Science, 1969, Holt,
Rinehart, Winston
The Unclean Sky, Doubleday, 1967

Continued and Additional Suggest.

Audio-Visual:

Canopy of Air, filmstrip, Life

Community:

Department of Natural
Resources

Materials

Continued and Additional Suggested Learning Experiences

1969, Holt,

eday, 1967

pp, Life

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 E enviromental alterations over time.
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Discipline Area Science
 Subject Earth Science
 Problem Orientation Land Use

BEHAVIORAL OBJECTIVE

Cognitive: Given an opportunity to select any given area of change, the students will measure, record, alter, and predict the future of the area under study.
Affective: The student will recommend change in and environment.

Skills to be Learned
 Project selection and formulation
 Project revision
 Recording, interpreting and reporting of results
 Inflicting of beneficial change on an environment.

SUGGESTED LEARNING EXPERIENCE

I. Student-Centered in class activity
 1. Class resource-research
 a. Students will select any area of study and will decide what aspect of their environment they want to examine.
 b. Students will have a "talk session" about plans of study and methods of change.
 c. Students will decide time limits for project, class time allotment and grading procedures.

II. Outside
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mental alterations over time.

Discipline Area Science

Subject

Earth Science

Problem Orientation Land Use Grade 8

GENERAL OBJECTIVE

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

1. Class resource-research
 - a. Students will select any area of study and will decide what aspect of their environment they want to examine.
 - b. Students will have a "talk session" about plans of study and methods of change.
 - c. Students will decide time limits for project, class time allotment and grading procedures.

II. Outside Resource and
Community Activities

1. Students and teachers will plan together to invite only those outside speakers that the students feel may offer significant information pertaining to their particular projects.
2. Speakers will confine their discussions to matters of importance to the seminar groups.
3. Outside resources will depend upon selected area of study. They may include:
 - a. Comprehensive study of inflow and outflow of a small pond.
 - b. Autumnal loss of leaves in local park area.
 - c. Construction of model showing coriolis effect.
 - d. Erosion in a new housing development.
 - e. Pollution of local streams.
 - f. Soil depth-temp correlations.
 - g. Study of local water tables. (cont.)

Resource and Reference Materials

Publications:

Modern Earth Science, Holt,
Rinehart, Winston, 1969.
The Earth: Its Changing Form,
Harcourt, Brace and World,
1970.

National Wildlife Fed.

1412 - 16th Street

Washington, D.C. 20036

A host of brochures,
pamphlets and magazines.

List of publications is
free.

Audio-Visual:

Community:

Continued and Additional Suggested

II.

4. Reporting methods may include
tables, models, written and or

Materials

Continued and Additional Suggested Learning Experiences

II.

4. Reporting methods may include photographs, tables, models, written and oral reports.

C 11. Individual acts, duplicated
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 N or compounded, produce significant Discipline Area Science
 C
 E environmental alterations over time. Subject Earth
 P
 T Problem Orientation Co

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPER
<p><u>Cognitive:</u> The students will write or illustrate with drawings the processes involved in wave erosion and its impact on the shore.</p> <p><u>Affective:</u> The students will propose ways to preserve shorelines in their immediate area and initiate action.</p>	<p>I. Student-Centered in class activity</p> <p>1. Filmstrip: <u>Evolution of Shorelines</u></p> <p>2. Readings: <u>Modern Earth Science</u></p> <p>3. Activities</p> <p>a. Use of wave demonstration table to show wave erosion.</p> <p>b. Comparative drawings in sequence.</p> <p>c. Research papers.</p>
<p><u>Skills to be Learned</u></p> <p>Collection of data and evaluation of data</p> <p>Illustration of concepts in written and drawn forms.</p>	

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Discipline Area Science

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Subject Earth Science

Problem Orientation Conservation Grade 8

AL OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Filmstrip: Evolution of Shorelines

2. Readings: Modern Earth Science

3. Activities

a. Use of wave demonstration table to show wave erosion.

b. Comparative drawings in sequence.

c. Research papers.

II. Outside Resource and Community Activities

1. Fieldtrip

a. Shorelines

1) Unprotected erosion

2) Protected-rip-rap

3) Show ways in use of preserving the shore

4) Planting trees and other land cover material along river banks.

2. State Conservation Department (D.N.R.)

Resource and Reference Materials

Continued and Additional Suggested

Publications:

Modern Earth Science, Holt,
Rinehart, Winston, c 1969,
pp. 300-305.

Audio-Visual:

Filmstrip:

Evolution of Shorelines

E. Shapiro and Company
43055 Kissena Blvd.
Flushing, New York 11355

Community:

Fieldtrip to suitable area:
i.e. Lakeshore or river bank.

ce Materials	Continued and Additional Suggested Learning Experiences
<p>Holt, 1969,</p> <p>PS y</p> <p>355</p> <p>area: er bank.</p>	

C 12. Private ownership must be
O
N regarded as a stewardship and
C
E should not encroach upon or violate
P
T the individual right of others.

Discipline Area Science
Subject Earth S
Problem Orientation Pollu

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> The student will be able to describe with an essay or oral presentation, the chemical balance of the atmosphere and how present industries are polluting the atmosphere.</p> <p><u>Affective:</u> The student will suggest that the problem of air pollution relates to the entire system of the atmosphere & atmospheric conditions.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Filmstrip: <u>Atmosphere & Its Circulation.</u> 2. Reading: <u>Modern Earth Science</u>, p. 408-414. 3. Investigations: <ol style="list-style-type: none"> a. Show chemical reactions with materials found in the air on different materials. b. Show oxidation on different materials. c. Write data & evaluate. d. Show with graphs & display of materials results of experiments.
<p><u>Skills to be Learned</u></p> <p>Gathering & recording information</p> <p>Reading of scientific instruments</p>	

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stewardship and

reach upon or violate

right of others.

Discipline Area Science

Subject Earth Science

Problem Orientation Pollution - Air Grade 8

OBJECTIVES

Student will
describe with an
presentation,
importance of the
how present
polluting

Student will
problem of
relates to the
the atmo-
spheric

learned
ording

scientific

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Classroom

1. Filmstrip: Atmosphere & Its Circulation.
2. Reading: Modern Earth Science, p. 408-414.
3. Investigations:
 - a. Show chemical reactions with materials found in the air on different materials.
 - b. Show oxidation on different materials.
 - c. Write data & evaluate.
 - d. Show with graphs & display of materials results of experiments.

II. Outside Resource and
Community Activities

A. Outdoor Investigations

1. Smoke pollution of air
2. Chemical pollution of air
 - a. Show how pollutants affect surrounding areas:
 1. Paint on houses, cars, etc.
 2. Plants
 3. Toxicity of air affecting nose, eye etc.

Resource and Reference Materials

Publications:

Modern Earth Science, C. 1969,
Holt, Rinehardt, Winston,
p. 408-414

Audio-Visual:

Filmstrip:

Atmosphere & Its Circulation,
Encyclopedia Britannica Films,
Inc. 1150 Wilmette Ave.,
Wilmette, Ill. 60091

Student made photographs from
field trip to area which
shows pollution of air

Community:

Continued and Additional Suggested Le

Materials

Continued and Additional Suggested Learning Experiences

1969,

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Films,

from

h

C 12. Private ownership must be

O regarded as a stewardship and

C should not encroach upon or violate

P the individual right of others.

Discipline Area Science

Subject Earth

Problem Orientation Pcl

BEHAVIORAL OBJECTIVES

Cognitive: Student will be able to construct an oil spill & by using his model, either orally or with a written essay, describe the safest way of cleaning the water of the oil.

Affective: The student will investigate the problem of pollution in the world's large bodies of water.

Skills to be Learned

Gathering information
Note taking
Preparing for discussion
Exhibiting information
Making evaluations
Supporting a position or opinion

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Classroom

1. Film: Rocks That Form Underground.
2. Readings from magazines, papers, etc. pertaining to oil pollution.
3. Reading: Modern Earth Science, p. 175-181.
4. Discussions:
 - a. Panel - pros & cons of progress through private ownership as it pertains to pollution of world's oceans.
 - b. Study of other oil resources.
 - c. Study of safer ways of securing oil from ocean deposits.
 - d. Better ways of cleaning up effected areas from oil spills.
5. Make displays showing ocean contamination & ways of cleaning these up.
6. Construct a model of ocean area.
 - a. Could be done on small outside pond
 - b. Large pan or (cont.)

ership must be _____
 ewardship and _____ Discipline Area Science
 ach upon or violate _____ Subject Earth Science
 ight of others. _____ Problem Orientation Pollution Grade 8

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
t will et an ng his ly or ay, t way ter of dent he on in oodies	I. Student-Centered in class activity A. Classroom 1. Film: <u>Rocks That Form Underground.</u> 2. Readings from magazines, papers, etc. pertaining to oil pollutions. 3. Reading: <u>Modern Earth Science, p. 175-181.</u> 4. Discussions: a. Panel - pros & cons of progress through private ownership as it pertains to pollution of world's oceans. b. Study of other oil resources. c. Study of safer ways of securing oil from ocean deposits. d. Better ways of cleaning up effected areas from oil spills. 5. Make displays showing ocean contamination & ways of cleaning these up. 6. Construct a model of ocean area. a. Could be done on small outside pond b. Large pan or (cont.)	II. Outside Resource and Community Activities
ed tion cussion ation s tion or		

Resource and Reference Materials
Publications:

Modern Earth Science, C. 1969,
Holt, Rinehart & Winston,
p. 175-181.
30 Basic Speech Experiences,
Clark Publishing Co.
American Petroleum Institute,
free brochures, booklets, etc.
Magazines - various magazines
showing oil pollution & results

Audio-Visual:

Film:

Rocks That Form Underground,
Encyclopedia Britannica Films,
Inc.

Community:

Continued and Additional Suggested
I. (cont.)

- aquarium in the school room
- c. Use sand for beach
- d. Small plants
- 7. Students will use model for:
 - a. Investigation for burning
 - 1. Measure temp. of water
 - 2. How it affects the plant
 - 3. How is the fire contained
 - b. Floating materials around sticks.
 - c. Teacher approved student ideas of the oil.
 - d. Some possible student ideas
 - 1. Chemical action
 - 2. Agitation of the water
 - 3. Controlled burning
 - 4. Wind

Materials	Continued and Additional Suggested Learning Experiences
<p>1969, n, ces, tute, s, etc. zines results</p> <p>ound, a Films,</p>	<p>I. (cont.)</p> <ul style="list-style-type: none"> aquarium in the school room c. Use sand for beach d. Small plants 7. Students will use model for: <ul style="list-style-type: none"> a. Investigation for burning oil out of the water. <ul style="list-style-type: none"> 1. Measure temp. of water 2. How it affects the plant life 3. How is the fire contained b. Floating materials around the oil. Some kinds of sticks. c. Teacher approved student ideas for dispersing the oil. d. Some possible student ideas: <ul style="list-style-type: none"> 1. Chemical action 2. Agitation of the water 3. Controlled burning 4. Wind

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish to use the following format. Please feel free to adapt it and add more pages. Let your comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials (specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

On each episode used in your class, you may wish to duplicate this suggested form. Please feel free to adapt it and add more pages. Let us know all your critiques and suggestions, negative and positive.

General Objectives
Positive:

Negative:

Developed

Learning Experiences
Class:

Home & Community Activities:

Resource & Reference Materials
(Include suggestions & comments)

ED055918

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONME

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 9

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338

Robert Warpir
Robert Kellne
George Howlet

INSTRUCTION - CURRICULUM - ENVIRONMENT

ENVIRONMENTAL EDUCATION

GRADE 9

S.E.A.

-8-9

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is of over a hundred teachers, year long meetings, a summer workshop ecologists, this guide means realistic, developed aid for you. Pl which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are des ces--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your to adapt, adopt, or use. Be design, the range of suggestions i mentation and usage are even wider. Many episodes are self-con others can be changed in part or developed more keenly over a possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning e plan. The reasons are simple. No guide has all the answers a unless viewed in the context of your classroom situation. Thu give it a triple reading, check over the resources listed, mak prime your students, and seek help. The Project personnel and knowledge page stand ready to aid your efforts. Feel free
4. The Project Resource Materials Center serves all CESA 3, 8, an private. We will send available materials pre-paid. Call for visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school librari Center materials. Please offer suggestions, comments, or advi service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch suggestions on the episode pages or use the attached evaluation lected in late May next year and will be used in our revisions. reactions and suggestions--negative and positive. Please note t in the episodes may refer to specific, local community resource cases, individual school districts and teachers will have to ad stitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--surviva Creation's beauty and complexity--often noted as the work of a and human energy to save. A year's work by a hundred of your f gesture. Without you, their work will crumble, and so might we let us live to think, feel, and act in harmony with our world.

1. Cognitive means a measurable mental skill, ability, or proce
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels a cog
4. EPA - Environmental Problem Area.

PREFACE

Students about their environment, help is ready. Thanks to the efforts of members, year long meetings, a summer workshop, university consultants and means realistic, developed aid for you. Please note the following ideas for teachers in writing and editing this guide.

Elementary in nature and the episodes are designed--at appropriate instances--existing, logical course content.

The guide offers suggestions. Since you know your students best, you decide what to use. Be design, the range of suggestions is wide; your chances for experimentation are even wider. Many episodes are self-contained, others open-ended, still others in part or developed more keenly over a few weeks. These built-in episodes are yours to explore.

You try the episodes and suggested learning experiences but please prepare simple. No guide has all the answers and no curriculum will work in the context of your classroom situation. Thus, before trying an episode, read, check over the resources listed, make mental and actual notes, and seek help. The Project personnel and teachers listed on the acknowledgment stand ready to aid your efforts. Feel free to ask their help in pre-planning. The Materials Center serves all CESA 3, 8, and area schools--public and private--and available materials pre-paid. Call for help, materials, or to 338.

Project ICE Bibliography in your school library or available Resource Center. Please offer suggestions, comments, or advice--at any time--so that this project can help each other.

Use the guide by reacting to it with scratch ideas, notes, and extended episode pages or use the attached evaluation format, which will be collected next year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed refer to specific, local community resources or conditions. In such cases, school districts and teachers will have to adopt local or available substitutes. Terms pertinent to the episodes is below.

Experts have simplified the issue--survival--yours, mine, our students, and complexity--often noted as the work of a genius--will take our genius to save. A year's work by a hundred of your fellow teachers is a saving grace. You, their work will crumble, and so might we all--literally. Instead, think, feel, and act in harmony with our world.

Editorial Board

Measurable mental skill, ability, or process based on factual data.
Student attitudes, values, and feelings.
Performance Will Include (labels a cognitive or mental performance.)
Problem Area.

ACKNOWLEDGEMENTS: The following teachers and consultants participated in the Supplementary Environmental Education

CESA #3

Eugene Anderson, Peshtigo
 Laura Berken, Oconto Falls
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 Nicholas Dal Santo, Pembine
 Robert Dickinson, Oconto
 Ann Fuhrmann, Marinette
 Lillian Goddard, Coleman
 William Harper, Lena
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 Michael Kersten, Suring
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 Ronald Hammond, Hortonville
 Jerome Hennes, Little Chute
 Barbara Huth, Menasha
 Darrell Johnson, Hortonville
 Bernadyne King, Neenah
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 John Little, Winneconne
 Gene Ploetz, Kaukauna
 Gordon Rohloff, Oshkosh
 William Schaff, St. Joseph
 Doris Stehr, Mt. Calvary (L)
 Carolyn Shills, New London
 Sister Dorothy, Xavier
 Clarence Trentlage, Freedom
 Mike Hawkins, Xavier
 Beth Hawkins, Xavier
 Ed Patschke, Menasha
 Connie Peterson, St. Martin(L)
 Dallas Werner, Kaukauna
 Ron Schreier, Omro

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 Charles Richards, UW-Marinette
 Ednajean Purcell, OSU
 David West, Lawrence U.

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the Supplementary Environmental Education Guide.

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Ruth Windmuller, Green Bay
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John Torgerson, Kewaunee
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Ray Gantenbein, Green Bay
David Bartz, Sturgeon Bay
John Hussey, Green Bay
Sister Barbara, St. Bernard

Ednajean Purcell, OSU
Nette David West, Lawrence U.

Robert Cook, UWGB
Dennis Bryan, UWGB

C 1. Energy from the sun, the basic source

O

N of all energy, is converted through

Discipline Area _____

C

E plant photosynthesis into a form all

Subject _____

P

T living things can use for life pro-
cesses.

Problem Orientation _____

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Determined by written test: The student will learn the effect of algae layers on light penetration of the water resource. The necessity of light penetration for plant growth at bottom of water resource. The effect that lack of plant growth has on fish population due to reduced oxygen supply, food supply & cover will be learned during the discussion portion of the activity.

Affective: If the student displays competency of all 3 of the above objectives by written test, he will have to admit orally or by written word that algae growth can be harmful to a water resource. This admission will prepare him for later discussion & learning of concepts No. 2 & 11.

- I. Student-Centered in class activity
1. Put 500cc of lagoon water previously filtered thru a No. 1 filter paper into a 600cc beaker.
 2. Put 500cc lagoon water loaded with algae into a 600cc beaker.
 3. Shine a flashlight or other suitable light source, 1 foot above the surface through the beakers held a given distance above a light meter or piece of white paper. Observe amount of light passing thru.
 4. Discuss results, in terms of amount of light available for bottom growing plants, photosynthesis, oxygen supply & pollution of this water source due to algae.

Skills to be Learned

Measuring skills

Observation

Handling labware

Making a conclusion

ESEA Title III - 59-70-0135-1 Project I-C-E

n, the basic source

verted through Discipline Area Science
into a form all Subject IPS or IME
for life pro- Problem Orientation Energy Use Grade 9
cesses.

VES	SUGGESTED LEARNING EXPERIENCES	
by nt f ene- - f lant, er at s on re- od us- ivity. ent all es l have rit- wth er on ter f	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none">1. Put 500cc of lagoon water previously filtered thru a No. 1 filter paper into a 600cc beaker.2. Put 500cc lagoon water loaded with algae into a 600cc beaker.3. Shine a flashlight or other suitable light source, 1 foot above the surface through the beakers held a given distance above a light meter or piece of white paper. Observe amount of light passing thru.4. Discuss results, in terms of amount of light available for bottom growing plants, photosynthesis, oxygen supply & pollution of this water source due to algae.	<p>II. Outside Resource and Community Activities</p> <ol style="list-style-type: none">1. Water for experiment on left is to be obtained from a local lagoon, pond or swamp by student team or while on a field trip. The importance of this pond should also be discussed and how it fits into nature's plan.

Resource and Reference Materials
Publications:

high school Biology text - 1969
or later.
Modern Biology - Holt, Rinehart,
& Winston.

Continued and Additional Suggested L

Audio-Visual:

Community:

Materials

Continued and Additional Suggested Learning Experiences

- 1969

Rinehart,

ESEA Title III - 59-70-0135-1 Project I-C-E

C 2. All living organisms interact among
 O
 N themselves and their environment,
 C
 E forming an intricate unit called an
 P
 T ecosystem.

Discipline Area Sc
 Subject Ph
 Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING ACTIVITIES

Cognitive: Orally or by writing, the student will identify with 80% accuracy, 10 varied recorded sounds. Also, the student will list, after observation or research, the effects of at least 2 sound intensities*
Objective: Students believe that sound (e.g., loudness, etc.) does affect animals & humans, therefore is an environmental influence.

Skills to be Learned
 To recognize certain objects & operations by the sounds made
 To listen
 To read an audiometer & relate readings to loudness for each individual's hearing

* on animals or humans.

- I. Student-Centered in class activity
 - A. Class work
 1. Check the acoustics in several school areas, such as the auditorium, gym, classroom & band practice room. Show how they differ & tell why. Do this by actual listening.
 2. Show the reactions of animals to mild sounds & during loud sounds. Use both tame & wild capture animals if possible. Chart decibel rating & animal reaction.

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and their environment,

Discipline Area Science

intricate unit called an

Subject Physical Science

Noise

Problem Orientation Pollution Grade 9

RAL OBJECTIVES

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recorded sounds.
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or humans.

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Class work

1. Check the acoustics in several school areas, such as the auditorium, gym, classroom & band practice room. Show how they differ & tell why. Do this by actual listening.

2. Show the reactions of animals to mild sounds & during loud sounds. Use both tame & wild captured animals if possible. Chart decibel rating & animal reaction.

II. Outside Resource and
Community Activities

A. Community work

1. Sounds are nearly everywhere. The specialization study of sound is acoustics. Some people accustomed to sound in our community would be:
 - a. Architects
 - b. Engineers
 - c. ContractorsOne of these individuals could possibly speak to your class.
2. Check loudness of the following with a decibel meter:
 - a. Whisper
 - b. Conversation
 - c. Hammer pounding
 - d. Chain saw

ence Materials

Continued and Additional Suggested Learning Experiences

c record

C 3. Environmental factors are limiting

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N on the numbers of organisms living

Discipline Area Sci

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E within their influence, thus, each

Subject

Phy

P

T environment has a carrying capacity.

Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> The students will measure off quadrats of 1/4 meter, then prepare a list count of species to a depth of 10 cm., finally they will analyze collected data.</p> <p><u>Affective:</u> Students will propose a hypothesis to explain the differences in list counts for the varying environments.</p>	<p>I. Student-Centered in class activity</p> <p>A. Have students select a site in each of the following:</p> <ol style="list-style-type: none"> 1. Sandy area 2. Grassy area 3. Wooded area 4. Wetland area <p>B. Then have them mark off 1/4 meter square plots. Collect organisms from each quadrat to a depth of 10 cm., placing them in a preservative.</p> <p>C. Return to the classroom and sort according to organisms, tabulate numbers separately for each quadrat sampled.</p> <p>D. Prepare a graphic illustration of the data.</p> <p>E. Relate the number of organisms to the concept of carrying capacity, suggesting reasons for varying distribution of organisms.</p>
<p><u>Skills to be Learned</u></p> <p>Data collection</p> <p>Interpretation</p> <p>Hypothesizing</p> <p>Experimentation</p>	

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organisms living

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carrying capacity.

Discipline Area Science

Subject

Physical Science

Problem Orientation Organisms

Grade 9

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Have students select a site in each of the following:

1. Sandy area
2. Grassy area
3. Wooded area
4. Wetland area

B. Then have them mark off 1/4 meter square plots. Collect organisms from each quadrat to a depth of 10 cm., placing them in a preservative.

C. Return to the classroom and sort according to organisms, tabulate numbers separately for each quadrat sampled.

D. Prepare a graphic illustration of the data.

E. Relate the number of organisms to the concept of carrying capacity, suggesting reasons for varying distribution of organisms.

II. Outside Resource and Community Activities

als	Continued and Additional Suggested Learning Experiences
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ESEA Title III - 59-70-0135-1 Project I-C-E

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4. An adequate supply of pure water
is essential for life.

Discipline Area _____ G
Subject _____ G
Problem Orientation _____ W

BEHAVIORAL OBJECTIVES

Cognitive: The student will demonstrate the necessity of maintaining the natural water cycle by environmental observations and field and lab experiments and data dealing with said cycle.
Affective: Students will investigate the amount and type of life supported by pure water in comparison to the amount and type of life supported by polluted water to determine the degree to which pure water is essential to life.

Skills to be Learned
Scientific observation
Field measurements
Deductive reasoning
Understanding natural processes

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
 1. Discussion - of properties of water-ice, steam, etc.
 2. Discussion - of location of water supplies.
 3. Develop a map or chart showing the water forms and movement, from previous discussions.
 4. Lab - Experiment showing the condensation of water on a cool surface.
 5. Experiment showing the movement of water under pressure.
 6. Simple lab experiment - show how evaporation cleans water-oceans-distillation.

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adequate supply of pure water
essential for life.

Discipline Area General Science

Subject General Science

Problem Orientation Water Supply Grade 9

GENERAL OBJECTIVES

The student will understand the necessity of the natural water environmental observation field and lab and data dealing cycle.

Students will understand the amount and be supported by in comparison to and type of life by polluted water and the degree to which water is essential.

What is Learned
Observation
Experiments
Reasoning
Understanding natural

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

1. Discussion - of properties of water-ice, steam, etc.
2. Discussion - of location of water supplies.
3. Develop a map or chart showing the water forms and movement, from previous discussions.
4. Lab - Experiment showing the condensation of water on a cool surface.
5. Experiment showing the movement of water under pressure.
6. Simple lab experiment - show how evaporation cleans water-oceans-distillation.

II. Outside Resource and Community Activities

1. Field Work - Determination of velocity of water movement in a nearby stream. Discussion of distance water travels to and from accessible areas.
2. Determine the volume of water flowing in a stream and try to determine the amount available to each person in a town.
3. Measure water dripping from faucets and compare amounts lost per person, etc.

Resource and Reference Materials

Continued and Additional Suggested Learning

Publications:

Textbook Manual

Library References

Audio-Visual:

"Nature's Plan"

BAVI - 1942

"Men's Problem"

BAVI-1974

Community:

Water Dept. Representative

D.N.R. Speakers

Materials	Continued and Additional Suggested Learning Experiences

C 4. An adequate supply of pure
O
N water is essential for life.
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Discipline Area Science
Subject Earth Science
Water
Problem Orientation Pollution

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EXPERIENCES
<p><u>Cognitive:</u> Students will be able to explain the role of glaciation in the formation of Wisconsin lakes. Students will be able to differentiate between normal lake aging & cultural eutrophication.</p> <p><u>Affective:</u> Given the opportunity to make an ethical judgement, students will point out that man's effect on receiving waters has been detrimental to water quality & that civic action is needed to prevent further damage to these waters.</p>	<p>I. Student-Centered in class activity</p> <p>A. Class</p> <ol style="list-style-type: none"> 1. Introduce the concepts of lake formation by glaciers (kettle lake process) as part of unit on glacial geology. 2. Relate to present day tropic conditions of various Wisconsin lakes. Students relate observations on lakes visited during vacation trips. Consider plant growth esp. 3. Discuss natural eutrophications & cultural eutrophication.
<p><u>Skills to be Learned</u></p> <p>Contrasting & comparison</p> <p>Following observations of field conditions</p> <p>Inferring real situations from lab model tests</p>	

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ntial for life.

Discipline Area Science

Subject

Earth Science - Physical Science

Water

Problem Orientation Pollution

Grade 9

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Class

1. Introduce the concepts of lake formation by glaciers (kettle lake process) as part of unit on glacial geology.
2. Relate to present day tropic conditions of various Wisconsin lakes. Students relate observations on lakes visited during vacation trips. Consider plant growth esp.
3. Discuss natural eutrophication & cultural eutrophication.

II. Outside Resource and Community Activities

A. Student Lab

1. In a large low pan or on a stream bed table, mix a thick slurry of sand & chunks of ice of various sizes. Let the ice melt & the water drain or evaporate. Observe for depressions created.
2. Field trip to a lake or pond & then to a marsh, bog or swamp to contrast progress of lake aging.
3. Investigating local conditions by personal contact & by consulting published material.
4. Show a film or film-strip depicting water pollution which emphasizes eutrophication speed up when man pollutes.
5. Discuss the change on rate of the lake aging process when pollution enters (cont.)

Continued and Additional Suggest-

II. (cont.)

a lake and apply this to water pollution.

6. Application. Students in local pollution additives eutrophication & find what recipient of these wastes the present status of the the local papers or talk -

General Rationale

Using the concept of lake
Thienemann into Oligotrophies
locate on a state map or pro
map, an example of each type
Oligotrophic - steep sided
cold, poor in
plankton & zo
poor, oxygen

Eutrophic - rich in nutrients
quantitatively :
lower lake.

Dystrophic - poor in nutrients
large amount of
reduced, acid
due to little
material.

The Spruce Bog, Nat. Film Board
of Canada

Environmental Pollution

Both by Wards Science

Community:

College-University faculty

DNR-Division of Environmental

Local sewage plant, Industries,

Agricultural operations as sources
of Eutrophic additives

Materials	Continued and Additional Suggested Learning Experiences
<p>e Earth, Earth Winston. Franz</p> <p>dson,</p> <p>y</p>	<p>II. (cont.)</p> <p>a lake and apply this to the need to regulate water pollution.</p> <p>6. Application. Students investigate the nature of local pollution additives which may speed up eutrophication & find what bodies of water are recipient of these wastes. Student investigates the present status of these bodies by consulting the local papers or talk to DNR agents, etc.</p>
<p>Water,</p> <p>Board</p> <p>nsin osits, nsin e.</p>	<p><u>General Rationale</u></p> <p>Using the concept of lake types as devised by Thienemann into Oligotrophic, Eutrophic & Dystrophic, locate on a state map or preferably a county or area map, an example of each type.</p> <p>Oligotrophic - steep sided geologically young, deep, cold, poor in nutrients, poor in phytoplankton & zooplankton, quantitatively poor, oxygen rich in lower zones.</p> <p>Eutrophic - rich in nutrients, and plankton, quantitatively rich, oxygen poor in lower lake.</p> <p>Dystrophic - poor in nutrients, phytoplankton, large amount of humus, bottom oxygen reduced, acid water, deep coffee color, due to little decomposition of humic material.</p>
<p>tal s Section ries, s sources</p>	

C 5. An adequate supply of clean air is
 O
 N essential because most organisms
 C
 E depend on oxygen, through respiration,
 P
 T to release the energy in their food.

Discipline Area _____
 Subject _____
 Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> The student will be able to identify causes and effects of air pollution through discussion of a filmstrip and through experimentation.</p> <p><u>Affective:</u> To appreciate the fact that polluted air is <u>not</u> good for people, and that everyone has the <u>right</u> to breathe clean air, therefore, everyone has an obligation not to pollute the air if he can help it.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. Show filmstrip & discuss each part, with students doing most of the talking. Teacher directs the discussion. All material is on the filmstrip. <u>Teacher should review beforehand.</u> 2. Note colors and appearance wherever possible, of polluting factors. 3. Burn small amount of flow of sulfur in a dish and allow students to become familiar with the odor of the SO₂ given off. This reacts with the H₂O to form sulfuric acid.
<p><u>Skills to be Learned</u></p> <p>Read chemical equations Recognize various types of air pollution by smell & color, if color is present</p>	<ol style="list-style-type: none"> 4. Put about 1 or 2 gms. of copper into <u>con.</u> Nitric acid & notice yellowish-brown fumes. These are nitrogen dioxide fumes & are poisonous. Waft fumes & allow students to detect the odor. (Do not use dilute acid as this will produce NO, not NO₂.) Nitrogen dioxide & water vapor produce nitric acid.

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ecause most organisms

Discipline Area

Science

xygen,through respiration,

Subject

Physical Science

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Problem Orientation Clean Air

Grade 9

AL OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class
activity

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sion. All material is on
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3. Burn small amount of flowers
of sulfur in a dish and
allow students to become
familiar with the odor of
the SO₂ given off. This
reacts with the H₂O to
form sulfuric acid.

$SO_2 + H_2O = H_2SO_3$
4. Put about 1 or 2 gms. of
copper into con. Nitric
acid & notice yellowish-
brown fumes. These are
nitrogen dioxide fumes
& are poisonous. Waft
fumes & allow students to
detect the odor. (Do not
use dilute acid as this will
produce NO, not NO₂.)
Nitrogen dioxide & water
vapor produce nitric acid.

II. Outside Resource and
Community Activities

Learned

al equations
arious types
tion by smell
color is present

Resource and Reference Materials
Publications:

Continued and Additional

Audio-Visual:

Filmstrips:

Environmental Pollution,

70 W 3800

Atmospheric Pollution,

No. 2

Ward's Educational Filmstrips

Community:

Materials	Continued and Additional Suggested Learning Experiences
<p>lmstrips</p>	

C 6. Natural resources are not equally

O

N distributed over the earth or over

C

E time and greatly affect the geographic

P

T conditions and quality of life.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

Cognitive: This activity will show in a humorous way that all resources are not found all over the earth. The students will know by each article where they are not likely to find certain resources. Each student after the discussion should know where & how each resource originated & where it is found.
Affective: By observing the students' proposals for conservation & recommendations, we can evaluate his feelings about this concept during a post-activity discussion.

Skills to be Learned

Use of library for materials
Trying out other sources not used before, such as clubs & societies & their publications.
Humorous & brief article of the newspaper variety
Use of community resources

SUGGESTED LEARNING

- | I. Student-Centered in class activity | II. |
|--|-----|
| "Impossible Times Newspaper" written by students. | |
| 1. Not-likely-to-happen headlines & short newspaper article concerning some locality, such as:
"Oil Struck in Green Bay"
"Oconto Falls Harvests First Orange Crop"
"Plants & Shrubs Buried 10 Years Ago Are Being Dug Today As Coal"
"Palm Beach Holds Annual Snowmobile Derby Tomorrow" | |
| 2. Put all articles on a large sheet of paper & hang on board. | |
| 3. Discuss why each is humorous & relate to the origin of the resource. Each student must be able to tell origin of his article. | |
| 4. Suggested areas to work on for each "paper."
a. Fossil fuels
b. Ores, minerals
c. Wildlife
d. Water
e. recreation & natural resources
f. forests | |

ESEA Title III - 59-70-0135-1 Project I-C-E

resources are not equally

of the earth or over

Discipline Area

Science

may affect the geographic

Subject

Earth Science

quality of life.

Problem Orientation

Natural

Resources

Grade 8-9

OBJECTIVES

activity
humorous way
resources are not
of the earth.
known by
they
find
Each
discuss-
where &
origi-
is found.
serving
resources
& recom-
an evalu-
about
ing a
discussion.

ed
materials
resources not
as clubs &
publications.
article
variety
resources

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

"Impossible Times Newspaper"
written by students.

1. Not-likely-to-happen head-
lines & short newspaper art-
icle concerning some locality,
such as:

"Oil Struck in Green Bay"

"Oconto Falls Harvests First
Orange Crop"

"Plants & Shrubs Buried 10
Years Ago Are Being Dug Today
As Coal"

"Palm Beach Holds Annual Snow-
mobile Derby Tomorrow"

2. Put all articles on a large
sheet of paper & hang on board.

3. Discuss why each is humorous
& relate to the origin of the
resource. Each student must be
able to tell origin of his
article.

4. Suggested areas to work on
for each "paper."

a. Fossil fuels

b. Ores, minerals

c. Wildlife

d. Water

e. recreation & natural resources

f. forests

II. Outside Resource and
Community Activities

Resource and Reference Materials

Publications:

Environmental Education Materials,

Nos. 33/34 pg. 40-49, Earth
Science texts.

Audio-Visual:

Films:

Our Vanishing Land, color,
16 min. McGraw-Hill.

Our Part in Conservation,
McGraw-Hill.

Community:

library

Geology Club

museum

oil companies

U. S. Forest Service

Continued and Additional Suggested Learning

rials	Continued and Additional Suggested Learning Experiences
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rials,

C 7. Factors such as facilitating transportation,
O
N economic conditions, population growth, Discipline-Area Scie
C
E and increased leisure time have a great Subject Gene
P
T influence on changes in land use and Problem Orientation La
centers of population density.

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING P
<p>Cognitive: The student will become aware of changing land uses and causes of the changes. He will demonstrate this awareness by acting on the debate team and by handing in a list of arguments.</p> <p>Affective: Too many people accept change, or the lack of it, without any question. Hopefully, the students will take a part as a result of the work.</p>	<p>I. Student-Centered in class activity</p> <p>A. Discuss a hypothetical unit of land and the various uses which could be applied to the land, and the reasons for such uses.</p> <p>B. Divide the class into "use" groups and have each group prepare debate arguments.</p> <p>C. Conduct a debate.</p> <p>D. Summarize by voting which land use would be best suited, based on arguments heard.</p>
<p><u>Skills to be Learned</u></p> <p>Personal interaction</p> <p>Decision making</p> <p>Reasoning power</p> <p>Writing (arguments)</p> <p>Voting - based on information learned from activity rather than "fun for student alone" motive</p>	

uch as facilitating transportation,

ditions, population growth, Discipline-Area Science

d leisure time have a great Subject General Science

changes in land use and Problem Orientation Land Uses Grade 9
population density.

L OBJECTIVES

student will
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causes of the
ill demonstrate
by acting on
m and by hand-
of arguments.
many people
or the lack
any question.
students will
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ments)
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from activity
"fun for
e" motive

SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A. Discuss a hypothetical unit of land and the various uses which could be applied to the land, and the reasons for such uses.
 - B. Divide the class into "use" groups and have each group prepare debate arguments.
 - C. Conduct a debate.
 - D. Summarize by voting which land use would be best suited, based on arguments heard.

- II. Outside Resource and Community Activities
- A. Take a field trip to a local marginal wooded lot and have the students determine the possible uses for the land. Set the possible uses and their reasons for the uses on paper.

Resource and Reference Materials

Continued and Additional Suggested

Publications:

Speaking by Doing
National Textbook Co.
Skokie, Illinois

Audio-Visual

Population growth films

Community:

Outside speaker
local zoning and planning man

ials

Continued and Additional Suggested Learning Experiences

man

C 6. Cultural, economic, social, and

C
N political factors determine status

C
E of man's values and attitudes

P
T toward his environment.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Students will write a short paragraph on the role played by wetlands in our environment. Students will be able to explain in a written or oral test how any 5 of the machines mentioned in the discussion activity (No. 1). Students will state in their own words the value of changing their minds in light of new knowledge.

Affective: During a discussion, students will propose new solutions and change their opinions when given additional info. They will volunteer to promote the anti-pollution campaign by rejecting any of the polluting devices mentioned in the activity. Acceptable performance will include willingness to give up a fun thing "that pollutes."

Skills to be Learned

solve problems by using available facts

Apply oneself in making decisions

(Cont.)

1. Student-Centered in class activity

1. Start a discussion by asking who would give up: snowmobiles, automobile, dune buggy, power mower, minibike, large outboards, second car, etc. Get student's feelings.

2. Show films of filmstrips dealing with material in discussion above.

3. Hold another discussion to find if anyone would change their mind.

4. Present a problem about which the students aren't likely to have much knowledge. Such as: "Given a city on a lake with a marsh next to city on lake. What would you propose? Collect all proposals, and then assign them to collect all information concerning the ecological value of wetlands. Bring in a guest speaker. After all data has been collected & speakers heard, ask students to again make proposals as to marshland. Check this last paper with first to see if attitudes have changed.

ESEA Title III - 59-70-0135-1 Project I-C-E

, economic, social, and

factors determine status

values and attitudes

environment.

Discipline Area Science

Subject Physical Science

Problem Orientation Attitudes Grade 9

AL OBJECTIVES

Students will write a paragraph on the value of wetlands in the environment. Students will explain in an oral test how machines men-
discuss
1). Students discuss their own value of changing in light of new

During a discussion, students will discuss solutions and opinions when given factual info. They will be asked to promote a conservation campaign. Any of the points mentioned in the discussion are acceptable. The discussion will include a discussion of giving up a car that pollutes."

Learned
by using
in making
ent.)

SUGGESTED LEARNING EXPERIENCES

- | I. Student-Centered in class activity | II. Outside Resource and Community Activities |
|--|---|
| 1. Start a discussion by asking who would give up: snowmobiles, automobile, dune buggy, power mower, minibike, large outboards, second car, etc. Get student's feelings. | |
| 2. Show films of filmstrips dealing with material in discussion above. | |
| 3. Hold another discussion to find if anyone would change their mind. | |
| 4. Present a problem about which the students aren't likely to have much knowledge. Such as: "Given a city on a lake with a marsh next to city on lake. What would you propose? Collect all proposals, and then assign them to collect all information concerning the ecological value of wetlands. Bring in a guest speaker. After all data has been collected & speakers heard, ask students to again make proposals as to marshland. Check this last paper with first to see if attitudes have changed. | |

Resource and Reference Materials
Publications:

A Wetland to Cherish, Instructional
Materials Center, Madison.
"Wetlands" pamphlet, State Dept.

Audio-Visual:

Films:

Using Community Resources

Garbage

Nature's Half Acre

The Gifts

all from Proj. I-C-E RMC

Crisis of the Environment, N.Y.

Times Book Div. (set of 5 film-
strips)

Community:

guest speaker from university
or DNR representative

Continued and Additional Sugg

Skills to be Learned (cont.)

To collect information

To change your mind without
have lost a battle

ce Materials

Continued and Additional Suggested Learning Experiences

Instructional
division.
State Dept.

Skills to be Learned (cont.)

To collect information

To change your mind without feeling some how that you
have lost a battle

sources

-E RMC
ment, N.Y.
t of 5 film-

niversity
ve

... Man has the ability to manage,
 manipulate, and change his
 environment.

Discipline Area Scien
 Subject Physi
 Problem Orientation Car

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Student will be able to demonstrate that repeated use of soil without fertilizer will alter soil fertility over a period of time.</p> <p><u>Affective:</u> The student investigates means of preventing soil depletion & makes a bulletin board display advocating it.</p>	<p>I. Student-Centered in class activity</p> <p>A. Class</p> <ol style="list-style-type: none"> 1. One of the major uses of sulfuric acid is in the making of fertilizers. Rock phosphate (apatite) which is quarried in great quantities in Florida & Tennessee, will not readily dissolve in the soil moisture. But when it is treated with sulfuric acid it becomes a super-phosphate, $(Ca(H_2PO_4)_2)$, which dissolves readily for plant nutrition. Show how this process makes important phosphate compounds available as a fertilizer for growing plants. 2. Discuss need to restore fertility of soils following cropping. 3. Use the following demonstration to show that unless phosphorus is frequently added to cropped soils, soil phosphorus is easily made unavailable to plants by natural processes. (cont.)
<p><u>Skills to be Learned</u></p> <p>Observation & comparison of experimental results</p> <p>Investigation of application of scientific theory to land management practices</p>	

the ability to manage,

, and change his

t.

Discipline Area Science

Subject Physical Science

Problem Orientation Care of soils Grade 9

RAL OBJECTIVES

Student will
emonstrate
d use of
fertilizer
oil fertility
d of time.
The student
means of
oil depletion
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cating it.

Learned
& comparison
ental results
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scientific
land management

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Class

1. One of the major uses of sulfuric acid is in the making of fertilizers. Rock phosphate (apatite) which is quarried in great quantities in Florida & Tennessee, will not readily dissolve in the soil moisture. But when it is treated with sulfuric acid it becomes a super-phosphate, $(Ca(H_2PO_4)_2)$, which dissolves readily for plant nutrition. Show how this process makes important phosphate compounds available as a fertilizer for growing plants.
2. Discuss need to restore fertility of soils following cropping.
3. Use the following demonstration to show that unless phosphorus is frequently added to cropped soils, soil phosphorus is easily made unavailable to plants by natural processes. (cont.)

II. Outside Resource and
Community Activities

A. Outside class

1. Have class speaker on subject:
 - a. Fertilizer salesman
 - b. Local feed mill manager
 - c. County Agriculture agent
2. Read materials outside of class about fertilizer & methods of application.

Resource and Reference Materials

Publications:

Chemistry texts

Agriculture texts

The Nature and Property of Soils,

Buckman & Brady, MacMillan

Laboratory Manual for Introductory

Soil Science, Foth & Jacobs,

Wm C. Brown Co.

Pamphlets on fertilizer application
from County Agriculture Extension
Office

Audio-Visual:

Gulf Sulfur Co., Texas, film on
mfg. of Sulfuric Acid & It's Uses

Community:

4-H Club

Feed and fertilizer dealer

County Agriculture Extension Service

Continued and Additional Suggested Learning

I. (cont.)

- a. Wash glassware with 1:1 hydrochloric acid to remove phosphate contamination from previous tests.
- b. Fill 4 test tubes with 5 ml of distilled water. Add 1 ppm phosphorus. $\text{Ca}(\text{H}_2\text{PO}_4)_2$ (mono) should be the source of the PO_4 in the solution.
- c. To one tube add 10 drops 1% FeCl_3 solution. Add 10 drops ammonium molybdate to tube as a control - shake. Add several drops of stannous chloride solution or pinches of stannous chloride powder to each tube. Stand several minutes. Compare results.
- d. To another tube add 5 ml saturated solution of $\text{Ca}(\text{H}_2\text{PO}_4)_2$ & to last tube add 5 ml distilled water. Filter contents of both tubes. Repeat the ammonium molybdate-stannous chloride test.
- e. Repeat set up for $\text{Ca}(\text{OH})_2$ comparison. cautiously add 6-8 drops 1-N H_2SO_4 to each test tube before running ammonium molybdate-stannous chloride test. Compare results.
- f. This should demonstrate the effect of pH on the solubility of rock phosphate.
- g. (Calcium salts in the soil precipitate phosphate ions at high pH levels and iron precipitates phosphate ions at low pH levels. The result is that when crops remove phosphate from the land, in turn removed from the land, in the following years, naturally in the soil is not easily available to plants in the following years.)

Continued and Additional Suggested Learning Experiences

I. (cont.)

- a. Wash glassware with 1:1 hydrochloric rinse to remove phosphate contamination from detergents.
- b. Fill 4 test tubes with 5 ml of distilled H_2O with 1 ppm phosphorus. $Ca(H_2PO_4)_2$ (mono calcium phosphate) should be the source of the PO_4 ion.
- c. To one tube add 10 drops 1% $FeCl_3$ - shake. Add 3 drops ammonium molybdate to tube & to one other tube as a control - shake. Add several drops of stannous chloride solution or pinhead speck of stannous chloride powder to each tube. Shake. Let stand several minutes. Compare results.
- d. To another tube add 5 ml saturated $Ca(OH)_2$ solution & to last tube add 5 ml distilled water. Filter contents of both tubes. Repeat ammonium molybdate-stannous chloride test. Compare results.
- e. Repeat set up for $Ca(OH)_2$ comparison but very cautiously add 6-8 drops 1-N H_2SO_4 to $Ca(OH)_2$ test tube before running ammonium molybdate/stannous chloride test. Compare with results of d. This should demonstrate the effect of acid on the solubility of rock phosphate.
- f. (Calcium salts in the soil precipitate phosphate ions at high pH levels and iron and aluminum salts precipitate phosphate ions at lower pH levels. The result is that when crops remove phosphate and are in turn removed from the land, insoluble phosphate naturally in the soil is not easily made available to plants in the following years.)

C 12. Private ownership must be regarded as
O
N a stewardship and should not encroach
C
E upon or violate the individual right
P
T of others.

Discipline Area _____
Subject Earth
Problem Orientation _____

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> To describe adequately in written or oral communication, the role of nature and of man in changing existing land forms by erosion/deposition processes.</p> <p><u>Affective:</u> To indicate concern that man sets long-term goals when working the land by inferring in their written and oral communications (discussion and tests) that man has a responsibility to maintain land in a usable condition for future generations.</p>	<p>I. Student-Centered in class activity</p> <ol style="list-style-type: none"> 1. By use of a stream bed table or stream table kit (can be student-made), students can observe the erosive force of water and the movement and deposit of eroded sediments. 2. Teacher explanation and class discussion of weathering, erosion and sedimentation from chapters on a unit on sedimentary processes and discussion of man's role as land custodian. 3. In studying earth science, it would be wise to put strong emphasis on the natural processes of weathering as a land former and to integrate this knowledge with the practical problem of man's influence in changing the rate of this natural process. <p style="text-align: right;">(cont.)</p>
<p><u>Skills to be Learned</u></p>	
<p>Correlation between natural and man-caused land forming processes.</p> <p>Analysis of model situations and relationship to real processes.</p>	

ownership must be regarded as

and should not encroach

te the individual right

Discipline Area Science

Subject Earth Science - Physical Science
Attitudes re:land

Problem Orientation care: Erosion Grade 9

OBJECTIVES

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tests) that
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and forming

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SUGGESTED LEARNING EXPERIENCES

**I. Student-Centered in
class activity**

1. By use of a stream bed table or stream table kit (can be student-made), students can observe the erosive force of water and the movement and deposit of eroded sediments.
2. Teacher explanation and class discussion of weathering, erosion and sedimentation from chapters on a unit on sedimentary processes and discussion of man's role as land custodian.

3. In studying earth science, it would be wise to put strong emphasis on the natural processes of weathering as a land former and to integrate this knowledge with the practical problem of man's influence in changing the rate of this natural process.

(cont.)

**II. Outside Resource and
Community Activities**

1. Field trip observation of natural weathering on local land formation, vegetation-al retardation of weathering process, and man's hastening of weathering process by poor land use practice. (This can be agricultural primarily, but be alert to the effects of urban and industrial development, road construction, etc.)

Resource and Reference Materials

Publications:

Modern Earth Science

Holt, Rinehart and Winston
Earth and Space Science

American Books - Van Nostrand

Investigating the Earth

ESCP Lab Manual

Audio-Visual:

Film-"Grasslands - Despoilation
and Imbalance" (Ecological
Imbalance) six disturbed systems.

Eye Gate Films

"Stream Erosion Cycle"

Hubbard Sci.

"Erosion - Leveling the Land"

14 min.-color- Brittanica

"Problems of Conservation Soil"

14 min.-color/bw-Brittanica

Community:

SCS District Office

Soils Technician

County Extension Office Staff

Earth Science Faculty-UWGB

Continued and Additional Suggested

I. (cont.)

The teaching process should begin with discussion explanation back. Discussion should include applica as change agent and as custodian be spent investigating the reason for short-term gains at the exper tivity of the land.

rials

Continued and Additional Suggested Learning Experiences

and

tion

tems.

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I. (cont.)

The teaching process should begin immediately in the lab with discussion explanation backing up direct observation. Discussion should include application to the role of man as change agent and as custodian of the land. Time should be spent investigating the reasons man abuses the land for short-term gains at the expense of long-term productivity of the land.

PROJECT I-C-E

Episode Evaluation Form
(Reproduce or duplicate as needed)

In commenting on each episode used in your class, you may wish to use the following format. Please feel free to adapt it and add more pages. Let us know your comments - negative and positive.

I. Behavioral Objectives

A. Cognitive:

B. Affective:

II. Skills Developed

III. Suggested Learning Experiences

A. In Class:

B. Outside & Community Activities:

IV. Suggested Resource & Reference Materials
(specific suggestions & comments)

PROJECT I-C-E

Episode Evaluation Form (Reproduce or duplicate as needed)

on each episode used in your class, you may wish to duplicate this suggested feel free to adapt it and add more pages. Let us know all your critiques and ive and positive.

Objectives
e:

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earning Experiences
:

& Community Activities:

resource & Reference Materials
uggestions & comments)

Project I - C - E

INSTRUCTION - CURRICULUM - ENVIRONMENTAL

ED055918

A SUPPLEMENTARY PROGRAM FOR ENVIRONMENTAL EDUCATION

DISCIPLINE AREA Science GRADE 10

Produced under Title III E.S.E.A.
PROJECT I-C-E
Serving Schools in CESA's 3-8-9
1927 Main Street
Green Bay, Wisconsin 54301
(414) 432-4338

Robert Wa
Robert Ka
George Ho

E INSTRUCTION - CURRICULUM - ENVIRONMENT

PROGRAM FOR ENVIRONMENTAL EDUCATION

Science GRADE 10

Title III E.S.E.A.

in CESA's 3-8-9

t
onsin 54301

Robert Warpinski, Director
Robert Kellner, Asst. Director
George Howlett, EE Specialist

PREFACE

If you wish to excite students about their environment, help is r of over a hundred teachers, year long meetings, a summer workshop, ecologists, this guide means realistic, developed aid for you. Plea which have directed teachers in writing and editing this guide.

1. This guide is supplementary in nature and the episodes are desig ces--to plug into existing, logical course content.
2. Each page or episode offers suggestions. Since you know your st to adapt, adopt, or use. Be design, the range of suggestions is mentation and usage are even wider. Many episodes are self-conta others can be changed in part or developed more keenly over a fe possibilities allow you to explore.
3. Now we urge that you try the episodes and suggested learning exp plan. The reasons are simple. No guide has all the answers and unless viewed in the context of your classroom situation. Thus, give it a triple reading, check over the resources listed, make prime your students, and seek help. The Project personnel and t knowledge page stand ready to aid your efforts. Feel free to
4. The Project Resource Materials Center serves all CESA 3, 8, and private. We will send available materials pre-paid. Call for a visit. Phone 432-4338.
5. Check often the Project ICE Bibliography in your school library : Center materials. Please offer suggestions, comments, or advice-- service may grow. Let's help each other.
6. Involve yourself with the guide by reacting to it with scratch ic suggestions on the episode pages or use the attached evaluation f lected in late May next year and will be used in our revisions. reactions and suggestions--negative and positive. Please note tha in the episodes may refer to specific, local community resources cases, individual school districts and teachers will have to adop stitutes. A list of terms pertinent to the episodes is below.
7. Ecologists and other experts have simplified the issue--survival- Creation's beauty and complexity--often noted as the work of a ge and human energy to save. A year's work by a hundred of your fel gesture. Without you, their work will crumble, and so might we a let us live to think, feel, and act in harmony with our world.

1. Cognitive means a measurable mental skill, ability, or process
2. Affective refers to student attitudes, values, and feelings.
3. APWI means Acceptable Performance Will Include (labels a cogni
4. EPA - Environmental Problem Area.

PREFACE

excite students about their environment, help is ready. Thanks to the efforts of teachers, year long meetings, a summer workshop, university consultants and guide means realistic, developed aid for you. Please note the following ideas tested teachers in writing and editing this Guide.

supplementary in nature and the episodes are designed--at appropriate instances--into existing, logical course content. Each episode offers suggestions. Since you know your students best, you decide what to adopt, or use. Be design, the range of suggestions is wide; your chances for experimentation are even wider. Many episodes are self-contained, others open-ended, still changed in part or developed more keenly over a few weeks. These built-in allow you to explore.

That you try the episodes and suggested learning experiences but please pre-pare reasons are simple. No guide has all the answers and no curriculum will work in the context of your classroom situation. Thus, before trying an episode, do some reading, check over the resources listed, make mental and actual notes, ask students, and seek help. The Project personnel and teachers listed on the acknowledgment page stand ready to aid your efforts. Feel free to ask their help in pre-planning. The Resource Materials Center serves all CESA 3, 8, and 9 area schools--public and private. We will send available materials pre-paid. Call for any help, materials, or to 432-4338.

Keep the Project ICE Bibliography in your school library for available Resource Materials. Please offer suggestions, comments, or advice--at any time--so that this work can grow. Let's help each other.

Work with the guide by reacting to it with scratch ideas, notes, and extended comments on the episode pages or use the attached evaluation format, which will be collected May next year and will be used in our revisions. We sincerely want your suggestions--negative and positive. Please note that some resources listed may refer to specific, local community resources or conditions. In such cases, individual school districts and teachers will have to adopt local or available substitutes. A list of terms pertinent to the episodes is below.

Other experts have simplified the issue--survival--yours, mine, our students, our community and complexity--often noted as the work of a genius--will take our genius to save. A year's work by a hundred of your fellow teachers is a saving grace. Without you, their work will crumble, and so might we all--literally. Instead, let's think, feel, and act in harmony with our world.

Editorial Board

Plans a measurable mental skill, ability, or process based on factual data. Refers to student attitudes, values, and feelings. Acceptable Performance Will Include (labels a cognitive or mental performance.) Environmental Problem Area.

ACKNOWLEDGEMENTS: The following teachers and consultants participated in the development of the Supplementary Environmental Education Program.

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Robert Dickinson, Oconto
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David Miskulin, Goodman
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Gailen Braun, Lena
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Lousene Benter, Gillett

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Lee Hallberg, Appleton
Ronald Hammond, Hortonville
Jerome Hennes, Little Chute
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Darrell Johnson, Hortonville
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h, Peshtigo
Oconto Falls
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Dallas Werner, Kaukauna
Ron Schreier, Cmro

ff
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Joyce Mateju, Algoma
Richard Minten, W. DePere
Gloria Morgan, Linsmeier Private
George Pederson, Southern Door
Alan Schuh, Pulaski
Thomas Weyers, Cathedral
Ruth Windmuller, Green Bay
James Wiza, DePere
John Torgerson, Kewaunee
Benjamin Roloff, Howard-Suamico
Greg Schmitt, Cathedral
John DeWan, Green Bay
Emmajean Harmann, Sevastopol
Ray Cantenbein, Green Bay
David Bartz, Sturgeon Bay
John Hussey, Green Bay
Sister Barbara, St. Bernard

Robert Cook, UWGB
Dennis Bryan, UWGB

C 1. Energy from the sun, the basic source

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Problem Orientation

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BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Student should be able to demonstrate that plant organisms are dependent on sun energy for photosynthesis.

Affective: The student will promote control of air pollutants by being able to suggest methods of air pollution control for his community.

Skills to be Learned

Culture a group of plant organisms

Construct an artificial atmosphere (leave to student's imagination)

Measure growth rate in plants.

I. Student-Centered in class activity

1. Student team should set up a plant-growth experiment where one group is subjected to sun energy directly while another is subjected to a filter device so that sunlight of the same intensity does not reach the plants.

Differences in growth rate should be evident.

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

1. Student team should set up a plant-growth experiment where one group is subjected to sun energy directly while another is subjected to a filter device so that sunlight of the same intensity does not reach the plants. Differences in growth rate should be evident.

II. Outside Resource and
Community Activities

1. Use the school area to observe signs of subdued growth because of blocking out of sunlight. Observe shaded growth areas as compared to open sunlight areas.
2. If possible, use wooded areas to compare vegetation on edges, in meadows, & in areas of least sunlight.
3. If possible, visit large greenhouse to observe methods of use of sunlight and means of controls for maximum growth of plants.

Materials	Continued and Additional Suggested Learning Experiences
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C 1. Energy from the sun, the basic source

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BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: The student will be able to determine areas where starch has been produced in leaves as a result of photosynthesis.
Affective: The student will be able to verify the importance of light in food production by plants and illustrate the exclusion of one variable.

Skills to be Learned

Scientific investigation
Comparison of results
and producing these on
drawings

I. Student-Centered in class activity
1. Lab Demonstration:
Photosynthesis - Obtain two small coleus or geranium plants in pots. Place one in dark for 24 hours. Leave other plant in direct sunlight for at least one hour before experiment. Remove one leaf from each plant and mark to tell apart. Place each of them in a beaker containing alcohol and boil until the chlorophyll is removed. Remove leaves, rinse with water, flood each with iodine. Rinse again with water & observe color of leaves. A dark blue-black color indicates the presence of starch food made by the leaf. Draw both leaves & shade areas where starch has been produced.

ESEA Title III - 59-70-0135-1 Project I-C-E

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SUGGESTED LEARNING EXPERIENCES

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I. Student-Centered in class activity
1. Lab Demonstration:
Photosynthesis - Obtain two small coleus or geranium plants in pots. Place one in dark for 24 hours. Leave other plant in direct sunlight for at least one hour before experiment. Remove one leaf from each plant and mark to tell apart. Place each of them in a beaker containing alcohol and boil until the chlorophyll is removed. Remove leaves, rinse with water, flood each with iodine. Rinse again with water & observe color of leaves. A dark blue-black color indicates the presence of starch food made by the leaf. Draw both leaves & shade areas where starch has been produced.

II. Outside Resource and Community Activities

Resource and Reference Materials

Continued and Additional Suggested Le

Publications:

Modern Biology, Ch. 6.

High School Biology - BSCS

Green Version

Interaction of Man & Biosphere,
ISC Project, p. 25-27, Investi-
gation 2.1

Audio-Visual:

Geranium or coleus plant

Alcohol

Iodine

Beaker

Hot plate

Community:

Materials	Continued and Additional Suggested Learning Experiences
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ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING ACTIVITIES
<p><u>Cognitive:</u> Upon completion of this investigation, the student will have completed, at an elementary level, the study of a soil community & observed the diversity of invertebrate life in a common biotic community: He will be able to properly demonstrate making a soil profile. He will gain an understanding of the influence of bedrock geology on the soil community by correlating parent matter contributions with key soil environmental factors. He will be able to measure comparative soil temperatures & be able to report the differences to the class. He will have discovered the abundance & the complexity of invertebrate organisms in a soil ecosystem. He will, by use of the Berlese funnel, discover that the arthropods are the most numerous of the soil inhabitants.</p> <p><u>Affective:</u> Upon completion of this investigation, the student will suggest the effects of various (cont.)</p>	<p>I. Student-Centered in class</p> <ol style="list-style-type: none"> 1. Make a soil profile <ol style="list-style-type: none"> a. To become familiar with cut through a well drain to select an area where the surface soil. b. Observe the depth of the & pH. c. Measure the pH of the 3 test kit. Record differences. d. Sketch the soil profile e. Similar tests may be made then a comparison can be made. 2. Study Regional Geology <ol style="list-style-type: none"> a. Read about the bedrock geology reference book for your area. b. Examine as many deep rock possible to observe the geology. c. Follow this with a record. (These may be obtained from by asking your county agricultural samples. 3. Compare air and soil temperatures <ol style="list-style-type: none"> a. The student will take the temperature at the surface morning, noon & midafternoon. Obtain temperatures for an open area; on a north texture; in a dry area, different plant cover, etc. b. Discuss temperature range effect of variations of

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GENERAL OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class and Outdoor Activities

1. Make a soil profile

- To become familiar with a soil profile, make a vertical cut through a well drained soil, being careful so as not to select an area where debris & fill has been added to the surface soil.
- Observe the depth of the various horizons, color, texture & pH.
- Measure the pH of the 3 major horizons with a soil pH test kit. Record differences & explain what it indicates.
- Sketch the soil profile, show horizons, depth, color & pH.
- Similar cuts may be made in other areas, perhaps a woods, then a comparison can be made.

2. Study Regional Geology

- Read about the bedrock geology of the region in a good reference book for your area.
- Examine as many deep roadside & other open cuts as possible to observe the different kinds of materials.
- Follow this with a recent soil survey for the area.
(These may be obtained from the Soil Conser. Service Office by asking your county agent). The student could collect samples.

3. Compare air and soil temperature variations

- The student will take the air temperature, then the soil temperature at the surface, 3 in. & 6 in. depths in the morning, noon & midafternoon on several different days. Obtain temperatures for the following: In the shade & in an open area; on a north & south slope; of soil of various textures; in a dry area, wet, & damp conditions; under different plant cover, with all other factors nearly alike.
- Discuss temperature range variations in air & soil & the effect of variations of temp. on organisms of soil. (cont.)

Resource and Reference Materials	Continued and Additional Suggest
<u>Publications:</u>	<u>Affective - (cont.)</u>
<u>BSCS Green ver. High School</u>	<u>environmental factors on the num</u>
<u>Biology, Chapters 3 & 4</u>	<u>of the soil ecosystem. The stude</u>
<u>Standard Biology Text-Sections on</u>	<u>the importance of the make-up of</u>
<u>Invertebrate animals & on Ecology</u>	<u>listing several poor soil condit</u>
<u>Taxonomic Keys to the Common Animals</u>	<u>Skills to be Learned</u>
<u>of the North Central States, Eddy</u>	<u>Procedures for investigating sc</u>
<u>& Hodson, Burgess Publishing</u>	<u>Computation - Manipulating appa</u>
<u>How to Know the Insects, Jacques,</u>	<u>invertebrate orders & classes -</u>
<u>W. C. Brown Co.</u>	<u>& recording - Data interpretati</u>
<u>What Insect is That, American Ed.</u>	<u>I. (cont.)</u>
<u>Center, Columbus, Ohio, \$.40</u>	<u>4. Analysis of invertebrate po</u>
<u>The Nature & Property of Soils,</u>	<u>The soil contains a great a</u>
<u>Buckman & Brady, MacMillan</u>	<u>organisms, which present pr</u>
<u>Pleistocene Geology of the Door</u>	<u>this is not an insurmountab</u>
<u>Peninsula, Wis., Thwaites &</u>	<u>to order is all that is nec</u>
<u>Bertrand-Bulletin of the Geologi-</u>	<u>a. Select a sample plot, one</u>
<u>cal Society of America, 1957</u>	<u>Samples may be analyzed fo</u>
<u>Fundamentals of Ecology, Eugene</u>	<u>organic matter.</u>
<u>Odum, Saunders Publishing Co.</u>	<u>b. The earthworm population</u>
<u>Local soil surveys & soil testing,</u>	<u>Use a potassium permanganate</u>
<u>pamphlets, U.S. Soil Conservation</u>	<u>rat; this will drive them</u>
<u>Service District Office</u>	<u>be collected, killed & fix</u>
<u>National Wildlife Federation, EQ</u>	<u>c. The number & species comp</u>
<u>Index, 1970, Soil (pamphlet)</u>	<u>population for each quadra</u>
<u>Audio-Visual:</u>	<u>the map & correlated with</u>
<u>New York Times, Crisis of the</u>	<u>vegetation & moisture. Dra</u>
<u>Environment, Part II, Breaking the</u>	<u>distribution as influenced</u>
<u>Biological Strand, Part IV, Preserve</u>	<u>d. Information from a previc</u>
<u>and Protect</u>	<u>temperatures may be used h</u>
<u>Wards Scientific Pollution #3 of</u>	<u>may be developed in relati</u>
<u>Environmental Pollution: Our World</u>	<u>e. Soil arthropods can be ex</u>
<u>in Crisis, 70W3800</u>	<u>of a Berlese funnel. See d</u>
<u>LeMotte Soil Chemical Kits & Soil</u>	<u>Berlese funnel in BSCS Gre</u>
<u>Book</u>	<u>(1st edition, the Student</u>
<u>Community:</u>	<u>the Text).</u>

rials	Continued and Additional Suggested Learning Experiences
ns on ecology Animals	<u>Affective - (cont.)</u> environmental factors on the numbers & species composition of the soil ecosystem. The student will be able to determine the importance of the make-up of soil as to productivity by listing several poor soil conditions.
, Eddy g ques, n Ed. 0 ls, oor ologi- 7 ene o. sting, vation EQ) e ing the Preserve ion #3 of r World Soil	<u>Skills to be Learned</u> Procedures for investigating soils - Collecting soil organisms - Computation - Manipulating apparatus - Identification of invertebrate orders & classes - Comparison - Data collection & recording - Data interpretation - Prediction - Discovery <u>I. (cont.)</u> 4. Analysis of invertebrate populations The soil contains a great abundance of small & unfamiliar organisms, which present problems in identification. But this is not an insurmountable problem, for identification to order is all that is necessary. a. Select a sample plot, one meter square at random. Samples may be analyzed for pH, calcium content, & organic matter. b. The earthworm population of the quadrat may be sampled. Use a potassium permanganate solution to soak the quadrat; this will drive them to the surface where they may be collected, killed & fixed in alcohol. c. The number & species composition of the earthworm population for each quadrat should then be plotted on the map & correlated with pH, calcium, organic matter, vegetation & moisture. Draw conclusions on earthworm distribution as influenced by the soil environment. d. Information from a previous investigation on #3 soil temperatures may be used here. A plot map of distribution may be developed in relationship to soil temperature. e. Soil arthropods can be extracted from the soil by means of a Berlese funnel. See directions for operation of the Berlese funnel in BSCS Green Version High School Biology. (1st edition, the Student Lab Manual & the 2nd edition, the Text).

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ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES
Cognitive: The student will be able to compare the effects of plants & animals in a sealed ecosystem.
Affective: The student will suggest several simple ecosystems in the immediate area which demonstrate his understanding of organism interaction. Examples: marsh, woods pond, etc.

Skills to be Learned
Scientific investigation
Visual observations & recording these
Effect thinking

SUGGESTED LEARNING EXPERIENCES
I. Student-Centered in class activity
A. Set up 4 sealed containers with water in each. Label 1-4. Add aquatic plant to #1, add plant & aquatic animal to #2, add just animal to #3, and use #4 as control (just water). Using bromothymol blue, place an indicator in all 4 and observe condition of plants & animals and also indicator change. Place all 4 in light for 24 hours before making observation. Explain reasons for any changes.

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CTIVES	SUGGESTED LEARNING EXPERIENCES	
ent will he effects in a ent will le eco- iate area s under- inter- rsh, woods	<p>I. Student-Centered in class activity</p> <p>A. Set up 4 sealed containers with water in each. Label 1-4. Add aquatic plant to #1, add plant & aquatic animal to #2, add just animal to #3, and use #4 as control (just water). Using bromothymol blue, place an indicator in all 4 and observe condition of plants & animals and also indicator change. Place all 4 in light for 24 hours before making observation. Explain reasons for any changes.</p>	<p>II. Outside Resource and Community Activities</p>
ation &		

Resource and Reference Materials

Continued and Additional S

Publications:

Books:

High School Biology, BSCS

Yellow version-appropriate
chapters

BSCS Green version-Invest. 1-5
Interrelationship of Producers
and Consumers

Ecology and Field Biology, Robert
L. Smith, Harper & Row, 1966

Modern Biology, Otto, Towle, 1969,
Ch. 49 & 50, Holt, Rinehart &
Winston

Audio-Visual:

Filmstrip:

Ecological Imbalance: Six
Systems Spoiled, FS ST2,
Eye Gate House, Inc.

Community:

Materials

Continued and Additional Suggested Learning Experiences

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BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING EX
<p><u>Cognitive:</u> The students will measure one environmental factor influencing plants & animals. This factor, light, will be measured in various school environments.</p> <p><u>Affective:</u> The students will investigate the availability of sunlight to the producers by taking light meter readings in varied environments, then suggesting what some of the effects on species distribution.</p>	<p>I. Student-Centered in class activity</p> <p>A. In class</p> <ol style="list-style-type: none"> 1. Students might discuss primary production in regard to availability of light. 2. Make a comparison of data from at least two different environments, infer what effect light availability has on species composition & photosynthesis production.
<p><u>Skills to be Learned</u></p> <p>Measurement</p> <p>Use of photometer</p> <p>Data collection</p> <p>Comparison</p> <p>Relationship of available light to photosynthesis</p> <p>Inferring</p>	

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SUGGESTED LEARNING EXPERIENCES

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- I. Student-Centered in class activity
- A. In class
1. Students might discuss primary production in regard to availability of light.
 2. Make a comparison of data from at least two different environments, infer what effect light availability has on species composition & photosynthesis production.

- II. Outside Resource and Community Activities
1. With a light meter, the student will record readings from various places around school. If a wooded, shrub or brushy area is available, readings may be taken & then expressed as percentages of the values obtained in the open at the same time.
 2. In a woods, for accuracy readings taken at 1 foot intervals along randomly, transects can be made. Sun flecks move with the changing position of the sun, & change in size, shape & intensity. Light intensity in other areas around the school at various levels, etc. may be recorded.
 3. A discussion of F. Blackman's experiments on photosynthesis, light intensity & temperature should follow.

Resource and Reference Materials

Publications:

Oosting, H. J., The Study of Plant Communities, W. H. Freeman & Co., 1956.

BSCS Blue Version, Chapter 9, Light as energy for life.

Dove, W. G., A simple chemical light meter. *Ecology*. 39:151-152.

Marquis, D. A. & G. Yelenosky. 1962. A chemical light meter for forest research. *Northeast Forest Exp. Sta. Paper* 165.

Platt, R. B. & J. E. Griffiths. 1964. *Environmental measurement and interpretation*. Reinhold, New York.

Ryther, J. H. 1956. The measurement of primary production.

Limnol. Oceanography. 1:72-84.

Audio-Visual:

Community:

Continued and Additional Suggested Learning

General Rationale

A record of certain physical factors of the environment is often essential in a critical study of a plant community. Some relatively simple methods are used for gathering this data.

The most useful method available for the measurement of light intensity in the field is to use a chemical light meter (which records in foot candles).

Using high range with the light meter and the incident light, read the photometer. If the light is less than 1000 foot candles, switch to low range. The light cells may be injured by prolonged exposure to direct light. Photosynthesis in plants & animals, proceeds dependent upon many environmental factors. Light, in combination with others can reveal the greatest speed of such processes.

erials	Continued and Additional Suggested Learning Experiences
<p>f</p> <p>9,</p> <p>cal</p> <p>51-152.</p> <p>ky.</p> <p>er for</p> <p>Forest</p> <p>ths.</p> <p>ement</p> <p>ld,</p> <p>sure-</p> <p>-84.</p>	<p><u>General Rationale</u></p> <p>A record of certain physical factors of the environment is often essential in a critical study of a particular plant community. Some relatively simple methods may be used for gathering this data.</p> <p>The most useful method available for the measurement of light intensity in the field is to use a photometer (a light meter) which records in foot candles.</p> <p>Using high range with the light meter at right angles to the incident light, read the photometer. If you read less than 1000 foot candles, switch to low range. Certain photo-cells may be injured by prolonged exposure to intense light, do not expose to direct light. Photosynthesis, as other processes in plants & animals, proceeds at a rate dependent upon many environmental factors. Light being one of these, in combination with others can result in the greatest speed of such processes.</p>

3. Environmental factors are limiting
on the numbers of organisms living
within their influence, thus, each
environment has a carrying capacity.

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BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> The student will show his understanding of carrying capacity by predicting what will occur in a population in which predators are removed, in written paragraph form. The student will first read Carl C. Lamb's fable, <u>The Last Winter</u>.</p> <p><u>Affective:</u> As population increases, the detrimental effects of increased density begin to slow down the growth until it reaches carrying capacity, the maximum number that can be supported in a given habitat. Once it reaches or approaches this level, it tends to fluctuate about it; but in some species, it may be followed by a population crash before the numbers reach some sort of equilibrium with the habitat.</p>	<p>I. Student-Centered in class activity</p> <p>A. Read Carl C. Lamb's, <u>The Last Winter</u>.</p> <p>Note:</p> <p>This magazine is available in most school libraries or a copy of the fable can be obtained from ICE Resource Center.</p>
<p><u>Skills to be Learned</u></p> <p>Paragraph writing</p> <p>Applying ecological principles to different situations</p>	

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
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A. Read Carl C. Lamb's, The
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Note:

This magazine is available
in most school libraries or
a copy of the fable can be
obtained from ICE Resource
Center.

II. Outside Resource and
Community Activities

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Resource and Reference Materials

Continued and Additional Suggested Le

Publications:

The Last Winter, C. C. Lamb,
National Parks, March 1970
Essay on Populations, T. R.
Malthus, 1798 (Reprinted in
Everyman's Library, 1914)
An Introduction to the Study
of Animal Populations, H. G.
Andrewartha, 1961, Univ. of
Chicago Press, Chicago
Wildlife Investigational Techniques,
H. S. Mosby, The Wildlife Society,
Washington, D. C.

Audio-Visual:

Community:

Materials

Continued and Additional Suggested Learning Experiences

Techniques,
Society,

C 3. Environmental factors are limiting
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 Problem Orientation

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING	
<p><u>Cognitive:</u> The student will conduct an experiment to determine various limiting factors involved in plant competition. Upon completion, the student will submit a brief report discussing the types of competition observed & their effects.</p> <p><u>Affective:</u> The student will be able to define the ecological problems caused by disruption of natural plant competition by man's activities & suggest ways of eliminating or minimizing them.</p>	<p>I. Student-Centered in class activity</p>	<p>II. C A B C</p>
<p><u>Skills to be Learned</u></p> <p>Setting up an experiment Using control in experiment Observation Recording Presenting the data Devise experiments</p>		

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Discipline Area Science

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Problem Orientation Carrying Capacity Grade 10

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
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II. Outside Resource and
Community Activities

- A. Set up competition cultures in boxes or large pots. Include sets of plants of the same species planted at varying numbers per unit area. Identical plants may be planted in rows, then different plants in the next row, or alternated, etc.
- B. Cultures of one species may be watered with extracts of another, & with accompanying control set up.
- C. Determine density, average height of individuals, average fresh weights, average width of widest leaf on each plant. Other characteristics the students might choose as being important can be observed. Record results, submit report & discuss data.

Resource and Reference Materials
Publications:

Chemical warfare among plants.
Scientific American. 180:48-51.
1949. Bonner, James.
BSCS-Green, Chapter 3.
Communities and Ecosystems.

Audio-Visual:

Use sunflower, *Helianthus annuus*,
wheat, marigolds, mustard,
tomatoes, etc.

Community:

Continued and Additional Suggested
General Rationale

The possession of suitable adaptive environmental factors of a given community guarantee that a particular species will survive. The presence of other species is a factor of competition. In most cases, competition is with each other in a direct physical sense, as in animal competition. Rather, they compete for the environment, which then may cause competition among plants. For an obvious example, one plant may intercept light before it reaches those of another. Roots of one may grow beneath those of another, and hence, deplete the soil of water or nutrient salts. Such competition is most obvious when individuals of the same species are grown at different densities.

erials	Continued and Additional Suggested Learning Experiences
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ts. 8-51.	<u>General Rationale</u>
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mus,	<p>The possession of suitable adaptations to the main environmental factors of a given community is no guarantee that a particular species will succeed in that community. The presence of other species introduces the factor of competition. In most cases, plants do not compete with each other in a direct physical fashion common to animal competition. Rather, they exert their effects on the environment, which then may cause changes on neighboring plants. For an obvious example, a tall plant will intercept light before it reaches a lower plant growing beneath it. Roots of one may grow more vigorously than those of another, and hence, deplete the soil of water or nutrient salts. Such competition is well exemplified when individuals of the same species are grown at different densities.</p>
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ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: The student will study one environmental factor, the wind, which directly or indirectly influences the biotic community. Making daily observations of wind direction & velocity using the Buefort Scale.

Affective: Upon completion of this unit, the student will suggest at least 2 environmental effects of wind upon producers within a local ecosystem.

I. Student-Centered in class activity.

A. In class

1. Implications of wind speed affects on plants & animals should be discussed.

Skills to be Learned

Observation

Recording

Presenting data

Inferring from data

factors are limiting

of organisms living

fluence, thus, each

a carrying capacity.

Discipline Area Science

Subject

Biology

Carrying

Problem Orientation

Capacity

Grade 10

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
Student Environmental which ctly tic daily nd direc- ing the ompletion student ast 2 cts of s system.	<p>I. Student-Centered in class activity</p> <p>A. In class</p> <p>1. Implications of wind speed affects on plants & animals should be discussed.</p>	<p>II. Outside Resource and Community Activities</p> <p>A. Outside class</p> <p>1. Students will make daily observations of wind & velocity, keeping & plotting of a daily record of these observations for a period of several weeks. The students will use the Buefort Scale.</p> <p>2. Upon completion of data collecting, graphs prepared will be discussed.</p> <p>3. If possible, it should be repeated during various seasons & a comparison made of direction & speed.</p>

Resource and Reference Materials

Publications:

Earth Science. The world we live in. Namowitz, Stone. D. Van Nostrand Company, Inc. New York. Any earth science text or reference for background on wind origin, rotation effects, etc.

Audio-Visual:

Beufort Scale for gauging the speed of wind.

A simple wind vane might be constructed.

Newspaper or weather chart showing high-low pressure center, direction, etc.

Community:

Continued and Additional Suggested Learning

General Rationale

Various kinds of instruments are used to record community studies, some being fairly sophisticated. These instruments may be of 4 kinds: anemometer, maximum-minimum, totalizing & recording.

A wind indicator may be fairly sophisticated. This exercise will be to measure one environmental factor, the wind, with relatively accurate, yet unsophisticated, inexpensive equipment.

BUEFORT SCALE - GAUGING THE SPEED OF WIND

1. In a calm, smoke rises vertically.
2. In a light air, less than three miles an hour, smoke drifts, but weathervanes remain unaffected.
3. In a slight breeze, about five miles, wind felt on the face, leaves rustle.
4. In a gentle breeze, about ten miles, wind felt on the face, light flag, small twigs & leaves are in motion.
5. A moderate breeze, roughly 15 miles, raises loose leaves, moves small branches.
6. Fresh breeze, 20 miles, small trees sway, waves on inland waters.
7. The strong breeze, 25-30 miles per hour, branches in motion, umbrellas are troublesome, wires whistle.
8. In a high wind, about 35 miles per hour, in motion, persons breast the blast with difficulty.
9. Next the gale, 40-45 miles, when twigs and small branches are broken, human progress is impeded.
10. A strong gale, blows some 50 miles an hour, causes structural damage, chimneys, slats thrown down.
11. A whole gale, blows around 60 miles, sea runs high, inland, whole trees uprooted.
12. Still fiercer are the storm & the Hurricane, called on sea, Tornado or Kansas cyclone.



als	Continued and Additional Suggested Learning Experiences
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ve	<u>General Rationale</u>
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rk. rence ,	Various kinds of instruments are used to record data in community studies, some being fairly sophisticated & expensive. These instruments may be of 4 kinds: instantaneous, maximum-minimum, totalizing & recording.
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	A wind indicator may be fairly sophisticated & expensive. This exercise will be to measure one environmental factor, the wind, with relatively accurate, yet unsophisticated & inexpensive equipment.
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	<u>BUEFORT SCALE - GAUGING THE SPEED OF WIND</u>
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- | | |
|--|---|
| | <ol style="list-style-type: none"> 1. In a <u>calm</u>, smoke rises vertically. 2. In a <u>light air</u>, less than three miles an hour, smoke drifts, but weathervanes remain unaffected. 3. In a <u>slight breeze</u>, about five miles, wind is felt on the face, leaves rustle. 4. In a <u>gentle breeze</u>, about ten miles, wind extends a light flag, small twigs & leaves are in motion. 5. A <u>moderate breeze</u>, roughly 15 miles, raises dust & loose leaves, moves small branches. 6. <u>Fresh breeze</u>, 20 miles, small trees sway, crested waves on inland waters. 7. The <u>strong breeze</u>, 25-30 miles per hour, sets large branches in motion, umbrellas are troublesome, telegraph wires whistle. 8. In a <u>high wind</u>, about 35 miles per hour, whole trees are in motion, persons breast the blast with some difficulty. 9. Next the <u>gale</u>, 40-45 miles, when twigs are broken, human progress is impeded. 10. A <u>strong gale</u>, blows some 50 miles an hour, slight structural damage, chimneys, slats thrown down. 11. A <u>whole gale</u>, blows around 60 miles, seldom experienced inland, whole trees uprooted. 12. Still fiercer are the <u>storm</u> & the <u>Hurricane</u> as it is called on sea, <u>Tornado</u> or <u>Kansas cyclone</u> on dry land. |
|--|---|



816

C 3. Environmental factors are limiting

O
N on the numbers of organisms living

C
E within their influence, thus, each

P
T environment has a carrying capacity.

Discipline Area Science

Subject Biology

Problem Orientation Case

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> The student will conduct an experiment in gathering field data, using soil, wet & dry weights. This should enhance his understanding of soil moisture as a limiting factor in an ecosystem.</p> <p><u>Affective:</u> Upon completion of this lesson, the student will be able to propose orally or in writing a procedure for determining water holding capacity & on water content of soil.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom experiment</p> <ol style="list-style-type: none"> 1. Collect a sample of soil with a hand trowel or large spoon, placing it in a small pop can opened at one end, & holes punched in the bottom. 2. Fill it approximately half full. Return sample to the lab, weigh sample plus can & record. 3. Place the can in an oven at 105°C for 72 hours. 4. Obtain the weight of the dry soil plus the container (total dry weight); finally obtain the container weight alone. (May pre-tare) 5. From these figures, calculate the amount of water originally present. Total wet weight-total dry weight Total dry weight-weight of container (X 100 = % water content) 6. In addition, water holding capacity may be determined by soaking the dehydrated soil in water for 24 hours then allowing them (cont.)
<p><u>Skills to be Learned</u></p> <p>Data collection</p> <p>Recording</p> <p>Observing</p>	

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ers of organisms living

Discipline Area Science

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Subject Biology

has a carrying capacity.

Carrying

Problem Orientation Capacity

Grade 10

AL OBJECTIVES

The student will
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dry weights. This
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determining
capacity &
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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

A. Classroom experiment

1. Collect a sample of
soil with a hand trowel
or large spoon, placing
it in a small pop can
opened at one end, &
holes punched in the
bottom.
2. Fill it approximately
half full. Return sample
to the lab, weigh sample
plus can & record.
3. Place the can in an oven
at 105°C for 72 hours.
4. Obtain the weight of the
dry soil plus the container
(total dry weight); finally
obtain the container weight
alone. (May pre-tare)
5. From these figures,
calculate the amount of
water originally present.
$$\frac{\text{Total wet weight} - \text{total dry weight}}{\text{Total dry weight} - \text{weight of containers}} \times 100 = \% \text{ water content}$$
6. In addition, water holding
capacity may be determined
by soaking the dehydrated
soil in water for 24 hours
then allowing them (cont.)

II. Outside Resource and
Community Activities

Resource and Reference Materials

Publications:

Lab Block-Field Ecology BSCS,
Edwin Phelps

Oosting, J. J. The Study of
Plant Communities. W. H. Freeman
& Co. 1956.

Smith, Robert L. Ecology and Field
Biology. Harper & Row. 1966.

Audio-Visual:

Community:

Continued and Additional Suggested Learning

I. (cont.)

to drain for 30 minutes & weighing. F
percentage of the water holding capac
original sample may be determined.

General Rationale

Measurement of soil moisture, like t
are most valuable when conducted over
least a full growing season. However,
on any one day may be useful for comp
The ability of a soil to supply moist
a very great influence in determining
grow in that soil. However, actual wa
poor measure of this ability because
variable quantity, depending upon len
the last rainfall, the season & other

ials

Continued and Additional Suggested Learning Experiences

I. (cont.)

to drain for 30 minutes & weighing. From this, the percentage of the water holding capacity in the original sample may be determined.

eman

Field

General Rationale

Measurement of soil moisture, like those of temperature, are most valuable when conducted over a period of at least a full growing season. However, single measurements on any one day may be useful for comparative purposes. The ability of a soil to supply moisture to plants has a very great influence in determining what kind of plants grow in that soil. However, actual water content is a poor measure of this ability because it is an extremely variable quantity, depending upon length of time since the last rainfall, the season & other factors.

C 3. Environmental factors are limiting
 O
 N on the numbers of organisms living
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 E within their influence, thus, each
 P
 T environment has a carrying capacity.

Discipline Area _____ Sc
 Subject _____ BI
 Problem Orientation _____ Po

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> The student will graph the results of what happens in a natural population when checks & balances of a predator are removed.</p> <p><u>Affective:</u> The student will accept the game laws of his state as set down by DNR as shown by not being arrested for violation.</p>	<p>I. Student-Centered in class activities</p> <ol style="list-style-type: none"> 1. Read worksheet on "Study of a Deer Population:" Complete answers to the questions & discuss in class. 2. Do lab investigation: Population Growth: A Model, BSCS Green Ver. 3. Do lab investigation: Study of a Yeast Population. BSCS Green Ver.
<p><u>Skills to be Learned</u></p> <p>Analysis of and presentation of data</p> <p>Graph preparation</p>	<p>II.</p> <ol style="list-style-type: none"> 4. Calculate the population density of trees, dogs, cats or some life form in your yard, block, town, or city. 5. Calculate the density of a particular plant in a limited area on the school grounds by actual count or by sample.

Environmental factors are limiting

of organisms living

influence, thus, each

has a carrying capacity.

Discipline Area

Science

Subject

Biology

Problem Orientation

Population

Grade

10

LEARNING OBJECTIVES

The student
results of
in a natural
checks &
predator are

The student
game laws
set down by
not being
isolation.

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and presenta-
tion

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activities

1. Read worksheet on "Study of a Deer Population:" Complete answers to the questions & discuss in class.
2. Do lab investigation: Population Growth: A Model, BSCS Green Ver.
3. Do lab investigation: Study of a Yeast Population. BSCS Green Ver.
4. Calculate the population density of trees, dogs, cats or some life form in your yard, block, town, or city.
5. Calculate the density of a particular plant in a limited area on the school grounds by actual count or by sample.

II. Outside Resource and Community Activities

Resource and Reference Materials

Publications:

T.R. Malthus - Essay on Population, 1798.

H.G. Andrewartha, 1961, An Introduction to the Study of Animal Populations, Univ. of Chicago.

Principles of Field Biology and Ecology by A.H. Benton & W.E. Werner.

Animal Ecology by S.C. Kendeigh.

Ecology by E.P. Odum.

Population Control in Animals by V.C. Wynne-Edwards.

Biology, BSCS, Green Version.

Modern Biology by J.H. Otto and Albert Towle, Holt, Rinehart & Winston. Chap. 49.

Inquiry into Biological Science, Jacobson, Kleinman, Hiack, Carr, and Sugarbaker, American Book Van Nostrand Co., 1969.

Audio-Visual:

NBC - Special on Wolf Population in Michigan.

Wildlife Investigation Techniques by H.S. Mosby. The Wildlife Society, Washington, D.C.

Community:

DNR representative
local area or plot studied

Continued and Additional Suggested Learning

Worksheet - Study of A Deer Population

A predator control program was started in the Grand National Forest on the rim of the Grand Canyon in Arizona in 1907. Cougars, wolves, and coyotes were hunted and killed by the most efficient methods. These predators had been attacking livestock on neighboring lands as well as the deer in the forest.

By 1910, the deer herd, which had been about 4000 animals, started to increase. By the year 1918, observers knew there was a population explosion, because the herd had grown to an estimated 30,000 animals. The predator control program was a success.

Biologists of the U.S. Forest Service were pleased and happy. But there were doubters. At several meetings were held while the predator control continued, and the deer herd grew. By 1923, 11 wolves, and 3000 coyotes had been killed in the National Forest. By 1923, seven individuals had warned the U.S. Forest Service that the deer herd continued to grow. By 1924, the herd was estimated at 100,000 animals. From 4000 to 100,000 deer in 17 years was a triumph in game management.

The winter of 1924 came early and hard on the National Forest. Snows were heavy and the ground was low. The winter of 1925 was the same. A very snowy, cold winter of 1924 and 1925. Many deer starved to death.

1. Sketch a graph of the deer population from 1910 and 1925.
2. What determiners of population density were responsible for the change in the deer population?
3. In what way did environmental factors act as determiners of population density?
4. What do you think would happen to the deer population if the predator control program was discontinued?

Continued and Additional Suggested Learning Experiences

Worksheet - Study of A Deer Population

A predator control program was started at the Kaibab National Forest on the rim of the Grand Canyon in Arizona in 1907. Cougars, wolves, and coyotes were hunted and killed by the most efficient methods possible. These predators had been attacking sheep and cattle on neighboring lands as well as the deer of the National Forest.

By 1910, the deer her, which had long remained balanced at about 4000 animals, started to increase rapidly. By the year 1918, observers knew there was a deer population explosion, because the herd had increased to an estimated 30,000 animals. The predator control program was a success.

Biologists of the U.S. Forest Service were proud and happy. But there were doubters. Arguments and meetings were held while the predator control program continued, and the deer herd grew. By 1923, 674 cougars, 11 wolves, and 3000 coyotes had been killed in the Kaibab National Forest. By 1923, seven independent investigators had warned the U.S. Forest Service of impending disaster. The deer herd continued to grow. By midsummer, 1924, the herd was estimated at 100,000 animals. The rise from 4000 to 100,000 deer in 17 years was clearly a triumph in game management.

The winter of 1924 came early and hard to the Kaibab National Forest. Snows were heavy and temperatures low. The winter of 1925 was the same. During the long, snowy, cold winter of 1924 and 1925, 60,000 deer starved to death.

1. Sketch a graph of the deer population between 1910 and 1925.
2. What determiners of population density were responsible for the change in the deer population?
3. In what way did environmental factors influence the determiners of population density.
4. What do you think would happen to the deer population(Cont.

Worksheet (Cont.)

if the predator control program was continued beyond 1925? What if the predator control program was halted?

as continued beyond 1925? What if the
ed?

C 4. An adequate supply of pure

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N water is essential for life.

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Discipline Area Sci

Subject Bio

Problem Orientation

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: The student will be able to determine all phases of the movement of water in our atmosphere, on the earth's surface and underground. He will be able to realize man's part in water usage & control.
Affective: The student will be able to defend the restrictive controls of water during the year in his community.

I. Student-Centered in class activity

Skills to be Learned

Make drawing to show water cycle
Develop ability to collect data
Construct scientific instruments
Interpret information
Make comparisons
Visual observations

Project I-C-E

ESEA Title III - 59-70-0135-1

adequate supply of pure

s essential for life.

Discipline Area Science

Subject Biology

Water

Problem Orientation Resources Grade 10

BEHAVIORAL OBJECTIVES

1. The student will
be able to determine all
the movement of
water in our atmosphere, on
the earth's surface and
below ground. He will be
able to realize man's part
in water usage & control.
2. The student
will be able to defend
the various water control
measures during the year
of study.

What to be Learned
1. Ability to show water
cycle
2. Ability to collect
water samples
3. Ability to use scientific
equipment
4. Ability to obtain
information
5. Ability to make
comparisons
6. Ability to make
observations

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

- II. Outside Resource and
Community Activities
- Build simplified rain
gauge--graduated empty
pop can.
 - Determine precipitation
amount at school site, or
home by rain gauge & com-
pare with nearest weather
station data.
 - Observe effects of runoff
on various soils and covers
(grass, forest, plowed
field, compacted pasture,
slopes, lawn, snowmobile
path)
 - Build simple demonstration
showing water runoff with
& w/o various covers. Use
grass, leaves, gravel, bare
soil.
 - Search for information on
water table depths & how
they vary during the year
& from year to year. Use
local well driller or
water department official
to supply information.
 - Determine through water
department records, the
difference of demands for
water during summer months
(cont.)

Resource and Reference Materials

Publications:

Biology, Addison Lee, The Steck Co.,
1964, p. 249
High School Biology, BSCS, Yellow
version

Audio-Visual:

Community:

Water Dept. Representative
DNR authority
Weather station
Well drilling company

Continued and Additional Suggested L

II. (cont.)

and winter months and then discuss
table. Try to list ways man increases
water during summer months.

e Materials

Continued and Additional Suggested Learning Experiences

The Steck Co.,

II. (cont.)

SCS, Yellow

and winter months and then discuss effect on water table. Try to list ways man increases his use of water during summer months.

tive

C 4. An adequate supply of pure
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N water is essential for life.
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Discipline Area Science

Subject Biology

Problem Orientation Conceptual

BEHAVIORAL OBJECTIVES

Cognitive: The student will be able to estimate his daily usage of H_2O & get a general idea of national usage of H_2O . He will compare to national rainfall as a source of water.
Affective: The student promotes proper water usage procedures for the school & community by listing several guidelines in this area.

Skills to be Learned

Individual investigation of daily water usage
Compile data
Make comparisons of data

SUGGESTED LEARNING ACTIVITIES

- I. Student-Centered in class activity
 - A. Class activity
 1. Make an approximation of water usage in the U.S., first calculate individual usage & guess amount in gallons. Assume U.S. population at 200 million & find U.S. usage. Compare class results & discuss differences. Find an average.
 2. Assume rainfall is source of all water we use. Use 30 in. as average rainfall for U.S. Estimate how many gallons of water in a sq. ft covered to a depth of 30 in. Over a sq. mile. Assume square miles in U.S. to be 3,600,000. How much water falls in U.S. in one year. How does this annual amount of rainfall compare with first amount of water used? Discuss comparisons & bring in idea of water cycle & industrial usage of H_2O .
 3. Make a diagram of water cycle. (cont.)

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Discipline Area Science

Subject Biology

Water

Problem Orientation Consumption Grade 10

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

A. Class activity

1. Make an approximation of water usage in the U.S., first calculate individual usage & guess amount in gallons. Assume U.S. population at 200 million & find U.S. usage. Compare class results & discuss differences. Find an average.

2. Assume rainfall is source of all water we use. Use 30 in. as average rainfall for U.S. Estimate how many gallons of water in a sq. ft covered to a depth of 30 in. Over a sq. mile. Assume square miles in U.S. to be 3,600,000. How much water falls in U.S. in one year. How does this annual amount of rainfall compare with first amount of water used? Discuss comparisons & bring in idea of water cycle & industrial usage of H₂O.
3. Make a diagram of water cycle. (cont.)

II. Outside Resource and Community Activities

A. Outside activity

1. Determine your families water consumption. Divide by number of individuals. How does this compare with others, class avg., community, state, or national?
 - a. Make or use water collection instruments, rain gauge, or/and get figures from the nearest local weather station.
2. Visit water treatment facilities.
3. Resource person from water dept. to talk to groups.

Resource and Reference Materials

Publications:

Any geography book for national average in rainfall

Audio-Visual:

Community:

Math teacher

County weather station for annual rainfall

Continued and Additional Suggest

I. (cont.)

4. In conjunction with math figures & calculations c a bubbler in school, for brush your teeth.
5. Make graphs to illustrate
6. Compare well versus lak pretreatment costs, etc.
7. List how you as an indi quality.

erials

Continued and Additional Suggested Learning Experiences

onal

I. (cont.)

4. In conjunction with math classes, set up problems, figures & calculations of projected water usage for a bubbler in school, for a school shower, while you brush your teeth.
5. Make graphs to illustrate water usage, rainfall, etc.
6. Compare well versus lake, etc. for water source, pretreatment costs, etc.
7. List how you as an individual, use and alter water quality.

C 5. An adequate supply of clean air is
 O
 N essential because most organisms
 C
 E depend on oxygen, through respiration,
 P
 T to release the energy in their food.

Discipline Area _____ S
 Subject _____ B
 Problem Orientation _____ C

ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING	
<p><u>Cognitive:</u> Student will be able to determine the various effects of pollutants in the air at different areas in the community.</p> <p><u>Affective:</u> In a spontaneous class discussion, student should be able to recommend improvements in community control of air pollution.</p>	<p>I. Student-Centered in class activity</p>	<p>II.</p>
<p><u>Skills to be Learned</u></p> <p>Visual observation & determination of effects of air pollution.</p> <p>Construct apparatus to measure air pollution.</p>		

ate supply of clean air is

ecause most organisms

xygen, through respiration,

he energy in their food.

Discipline Area

Science

Subject

Biology

Problem Orientation

Clean Air

Grade

10

L OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class
activity

II. Outside Resource and
Community Activities

1. Corrosion test panels
made from aluminum foil
strips can be placed outdoors
at various locations around
the school & community. Similar
test panels can be placed in-
side closed jars at same loca-
tions. Particulate collectors
at the same sites can give
additional data. Compare
visually. Determine: Which
areas are most corrosive?
Which areas have the most
particulate matter? Is the
particulate matter corrosive?
Is corrosion a problem & what
can be done about it.

Resource and Reference Materials
Publications:

Continued and Additional

Modern Biology, Otto & Towle,
p. 729-731, Holt, Rinehart, &
Winston, 1969.

High School Biology BSCS Green
Version 2nd edition, p. 764-770.

Audio-Visual:

Filmstrip:

Environmental Pollution,
Ward's Inc., 1969.

Community:

nce Materials

Continued and Additional Suggested Learning Experiences

& Towle,
inehart, &

BSCS Green
, p. 764-770.

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C 6. Natural resources are not equally

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N distributed over the earth or over

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E time and greatly affect the geographic

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T conditions and quality of life.

Discipline Area _____

Subject _____

Problem Orientation _____

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: The student will first determine how he can best sample a given quadrat (study area). Then using this technique will sample the area for vegetation types and graphically illustrate the distribution.
Affective: Upon completion of this investigation, the student will recognize various environmental factors which contribute to distribution of plant species, and suggest means of limiting detrimental factors.

I. Student-Centered in class activity

Skills to be Learned

Developing sampling technique

Sampling

Presenting data in graph form

Identifying plants

Use of keys

Charting-samples- visually/artistically

ESEA Title III - 59-70-0135-1 Project I-C-E

all resources are not equally

ed over the earth or over

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Discipline Area

Science

Subject

Biology

Plants &

Problem Orientation

Resources

Grade 10

ORAL OBJECTIVES

The student determine how sample a given study area). Then technique will area for vegetation and graphically the distribution. Upon completion investigation, the student recognize various environmental factors contribute to distribution of plant species, and means of limiting factors.

What is Learned

sampling technique

data in graph

g plants

samples- visually

SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity

II. Outside Resource and Community Activities

1. Upon selecting an area for study, the student will determine how to sample an area, have it approved by the teacher then sample the area. Bring in a sample of vegetation types where possible or identify in the field. If positive identification cannot be made, use plant form; broadleaf, narrow-leaf, etc.

Some suggestions for sampling might be to toss a hula-hoop over your shoulder. Or by a more positive transect through the area.

Resource and Reference Materials
Publications:

The Study of Plant Communities,
Freeman & Co., 1956, Ch. 3-4.
Some Sampling Characteristics of
a Population of Randomly-Dispersed
Individuals, Ecol. 34. pp. 741-757,
1957.

Audio-Visual:

Community:

art teacher for graphic
illustration

Continued and Additional Suggested Le

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Continued and Additional Suggested Learning Experiences

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C 6. Natural resources are not equally

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Discipline Area _____

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Subject _____

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T conditions and quality of life.

Problem Orientation _____

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING

Cognitive: Student will be able to calculate amount of different kinds of food needed to sustain a single person for a period of time. (day, week, etc.)

Affective: Student will demonstrate ability to determine foods that are low on the food pyramid by listing several of these foods.

Skills to be Learned

Calculation of calorie needs of man, calculation of efficiency of trophic levels.

I. Student-Centered in class activity

1. Students can be assigned to estimate weight of meat or plant material needed to sustain a human adult.

2. With this in mind, student should be able to show how man's habit of eating high on food pyramid (meat) is much less efficient in an ecosystem that his subsisting on grains, (for example lower on food pyramid. Why are these food used? (food value, taste, convenience, cost)

3. Student should also examine food content (energy source, essential amino acids, trace elements, vitamins.)

4. Present panel discussion on human tradition on selecting foods.

5. Keep log of food consumption.

ESEA Title III - 59-70-0135-1 Project I-C-E

sources are not equally

over the earth or over

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quality of life.

Discipline Area Science

Subject

Biology

Food as a

Problem Orientation Resource Grade 10

OBJECTIVES

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
1. Students can be assigned to estimate weight of meat or plant material needed to sustain a human adult.
 2. With this in mind, student should be able to show how man's habit of eating high on food pyramid (meat) is much less efficient in an ecosystem that his subsisting on grains, (for example) lower on food pyramid. Why are these food used? (food value, taste, convenience, cost)
 3. Student should also examine food content (energy source, essential amino acids, trace elements, vitamins.)
 4. Present panel discussion on human tradition on selecting foods.
 5. Keep log of food consumption.

- II. Outside Resource and Community Activities
1. Visit local slaughterhouse.

Resource and Reference Materials
Publications:

Ecology text should provide
estimates on biomass or caloric
content of hypothetical food
pyramid

Audio-Visual:

World population figures

Community:

Home Economics teacher

Continued and Additional Suggest

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Continued and Additional Suggested Learning Experiences

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Project I-C-E

ESEA Title III - 59-70-0135 1

C 7 Factors such as facilitating transportation,
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centers of population density.

BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EXPERIENCES

Cognitive: Upon completion of this lesson, the student will recognize and site evidence for an environmental problem of destruction of natural resources: air, land, water, scenic beauty, by industry, highway builders, sigh clutter, overpopulation, etc. within his own community.
Affective: Upon completion of this lesson, the student will propose at least one justification for preservation over progress.

Skills to be Learned

Recognition of problems
 Reporting
 Discussion (communication skills)
 Gathering information
 Preparing reports

1. Student-Centered in class activity
1. The teacher will present Part IV Preserve and Protect from Crisis of the Environment.
2. Make a map of the state and National Parks and forests in your state.
3. Write a history of the establishment of a national park.
4. Report on a bill before Congress in the current session which deals with preservation of wilderness or conservation of natural resources.
5. Report on the Wild Rivers Bill which sets aside rivers, as the Wolf in Wisconsin.
6. Send a letter expressing your views about a current conservation dispute to the appropriate government official.
7. Write a paper on what wilderness means to you.
8. Write a government or private conservation agency, and find out what it does.

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SUGGESTED LEARNING EXPERIENCES

- | | I. Student-Centered in class activity | II. Outside Resource and Community Activities |
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re- | 1. The teacher will present Part IV <u>Preserve and Protect</u> from Crisis of the Environment. | 1. The student will study a problem within his community, for example a conflict of use of a park area, a proposed road, etc., and report on same. |
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tter,
n | 2. Make a map of the state and National Parks and forests in your state. | |
| t | 3. Write a history of the establishment of a national park. | |
| tion | 4. Report on a bill before Congress in the current session which deals with preservation of wilderness or conservation of natural resources. | |
| | 5. Report on the Wild Rivers Bill which sets aside rivers, as the Wolf in Wisconsin. | |
| | 6. Send a letter expressing your views about a current conservation dispute to the appropriate government official. | |
| | 7. Write a paper on what wilderness means to you. | |
| | 8. Write a government or private conservation agency, and find out what it does. | |

Resource and Reference Materials

Continued and Additional Sugg

Publications:

The Quiet Crisis

Stewart Udall

Avon 1967

America the Raped

Gene Marine,

Simon and Schuster 1969

Sierra Club Bulletin

The Sierra Club, monthly

National Parks Magazine

Sand County Almanac

Aldo Leopold

Audio-Visual:

Eyegate Series

Aggradation-Degradation

Community:

Local conservation agency

Local conservation groups

Materials	Continued and Additional Suggested Learning Experiences
<p>1969</p> <p>Monthly</p> <p>1</p> <p>cy</p> <p>ps</p>	<p>Continued and Additional Suggested Learning Experiences</p> <p>1. Read the story "The Little Red Riding Hood" and discuss the characters and the plot.</p> <p>2. Write a short story about a character who is like Little Red Riding Hood.</p> <p>3. Draw a picture of Little Red Riding Hood and her basket.</p> <p>4. Make a costume for Little Red Riding Hood.</p> <p>5. Read the story "The Three Little Pigs" and discuss the characters and the plot.</p> <p>6. Write a short story about a character who is like one of the three little pigs.</p> <p>7. Draw a picture of one of the three little pigs.</p> <p>8. Make a costume for one of the three little pigs.</p> <p>9. Read the story "The Wolf and the Lamb" and discuss the characters and the plot.</p> <p>10. Write a short story about a character who is like the wolf or the lamb.</p> <p>11. Draw a picture of the wolf or the lamb.</p> <p>12. Make a costume for the wolf or the lamb.</p> <p>13. Read the story "The Boy Who Cried Wolf" and discuss the characters and the plot.</p> <p>14. Write a short story about a character who is like the boy or the wolf.</p> <p>15. Draw a picture of the boy or the wolf.</p> <p>16. Make a costume for the boy or the wolf.</p> <p>17. Read the story "The Tortoise and the Hare" and discuss the characters and the plot.</p> <p>18. Write a short story about a character who is like the tortoise or the hare.</p> <p>19. Draw a picture of the tortoise or the hare.</p> <p>20. Make a costume for the tortoise or the hare.</p> <p>21. Read the story "The Ant and the Grasshopper" and discuss the characters and the plot.</p> <p>22. Write a short story about a character who is like the ant or the grasshopper.</p> <p>23. Draw a picture of the ant or the grasshopper.</p> <p>24. Make a costume for the ant or the grasshopper.</p> <p>25. Read the story "The Lion and the Mouse" and discuss the characters and the plot.</p> <p>26. Write a short story about a character who is like the lion or the mouse.</p> <p>27. Draw a picture of the lion or the mouse.</p> <p>28. Make a costume for the lion or the mouse.</p> <p>29. Read the story "The Frog and the Toad" and discuss the characters and the plot.</p> <p>30. Write a short story about a character who is like the frog or the toad.</p> <p>31. Draw a picture of the frog or the toad.</p> <p>32. Make a costume for the frog or the toad.</p> <p>33. Read the story "The Duck and the Rabbit" and discuss the characters and the plot.</p> <p>34. Write a short story about a character who is like the duck or the rabbit.</p> <p>35. Draw a picture of the duck or the rabbit.</p> <p>36. Make a costume for the duck or the rabbit.</p> <p>37. Read the story "The Cat and the Hat" and discuss the characters and the plot.</p> <p>38. Write a short story about a character who is like the cat or the hat.</p> <p>39. Draw a picture of the cat or the hat.</p> <p>40. Make a costume for the cat or the hat.</p> <p>41. Read the story "The Dog and the Bone" and discuss the characters and the plot.</p> <p>42. Write a short story about a character who is like the dog or the bone.</p> <p>43. Draw a picture of the dog or the bone.</p> <p>44. Make a costume for the dog or the bone.</p> <p>45. Read the story "The Pig and the Apple" and discuss the characters and the plot.</p> <p>46. Write a short story about a character who is like the pig or the apple.</p> <p>47. Draw a picture of the pig or the apple.</p> <p>48. Make a costume for the pig or the apple.</p> <p>49. Read the story "The Cow and the Milk" and discuss the characters and the plot.</p> <p>50. Write a short story about a character who is like the cow or the milk.</p> <p>51. Draw a picture of the cow or the milk.</p> <p>52. Make a costume for the cow or the milk.</p> <p>53. Read the story "The Horse and the Carrot" and discuss the characters and the plot.</p> <p>54. Write a short story about a character who is like the horse or the carrot.</p> <p>55. Draw a picture of the horse or the carrot.</p> <p>56. Make a costume for the horse or the carrot.</p> <p>57. Read the story "The Sheep and the Grass" and discuss the characters and the plot.</p> <p>58. Write a short story about a character who is like the sheep or the grass.</p> <p>59. Draw a picture of the sheep or the grass.</p> <p>60. Make a costume for the sheep or the grass.</p> <p>61. Read the story "The Goat and the Cheese" and discuss the characters and the plot.</p> <p>62. Write a short story about a character who is like the goat or the cheese.</p> <p>63. Draw a picture of the goat or the cheese.</p> <p>64. Make a costume for the goat or the cheese.</p> <p>65. Read the story "The Chicken and the Worm" and discuss the characters and the plot.</p> <p>66. Write a short story about a character who is like the chicken or the worm.</p> <p>67. Draw a picture of the chicken or the worm.</p> <p>68. Make a costume for the chicken or the worm.</p> <p>69. Read the story "The Fish and the Bait" and discuss the characters and the plot.</p> <p>70. Write a short story about a character who is like the fish or the bait.</p> <p>71. Draw a picture of the fish or the bait.</p> <p>72. Make a costume for the fish or the bait.</p> <p>73. Read the story "The Bird and the Seed" and discuss the characters and the plot.</p> <p>74. Write a short story about a character who is like the bird or the seed.</p> <p>75. Draw a picture of the bird or the seed.</p> <p>76. Make a costume for the bird or the seed.</p> <p>77. Read the story "The Insect and the Leaf" and discuss the characters and the plot.</p> <p>78. Write a short story about a character who is like the insect or the leaf.</p> <p>79. Draw a picture of the insect or the leaf.</p> <p>80. Make a costume for the insect or the leaf.</p> <p>81. Read the story "The Plant and the Sun" and discuss the characters and the plot.</p> <p>82. Write a short story about a character who is like the plant or the sun.</p> <p>83. Draw a picture of the plant or the sun.</p> <p>84. Make a costume for the plant or the sun.</p> <p>85. Read the story "The Tree and the Wind" and discuss the characters and the plot.</p> <p>86. Write a short story about a character who is like the tree or the wind.</p> <p>87. Draw a picture of the tree or the wind.</p> <p>88. Make a costume for the tree or the wind.</p> <p>89. Read the story "The Mountain and the Cloud" and discuss the characters and the plot.</p> <p>90. Write a short story about a character who is like the mountain or the cloud.</p> <p>91. Draw a picture of the mountain or the cloud.</p> <p>92. Make a costume for the mountain or the cloud.</p> <p>93. Read the story "The River and the Stone" and discuss the characters and the plot.</p> <p>94. Write a short story about a character who is like the river or the stone.</p> <p>95. Draw a picture of the river or the stone.</p> <p>96. Make a costume for the river or the stone.</p> <p>97. Read the story "The Ocean and the Ship" and discuss the characters and the plot.</p> <p>98. Write a short story about a character who is like the ocean or the ship.</p> <p>99. Draw a picture of the ocean or the ship.</p> <p>100. Make a costume for the ocean or the ship.</p>

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ESEA Title III - 59-70-0135-1 Project I-C-E	BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING	
	<p>Cognitive: Student will be able to demonstrate through mathematical estimates and predictions how man has changed earth surface to a non-productive condition.</p> <p>Affective: Student will be able to promote within the school and community an attitude of awareness for wise usage of land.</p>	<p>I. Student-Centered in class activity</p> <p>Student should be confronted with problem of land surface usage for highways and how future demands for roads will consume productive lands.</p> <ol style="list-style-type: none"> 1. The student will try to calculate area (in square miles) covered by state, county and federal roads in county. 2. Having found total area the student should try to predict needs of future (10-20-30 years). 3. An additional experience would be to estimate value of land covered by highways as to agricultural value, recreational value and forested areas. 	II
	<p><u>Skills to be Learned</u></p> <p>Measuring areas, estimating distances, use of maps, calculation of areas, understanding notion of non-productivity.</p>		

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Problem Orientation Land Use

Grade 10

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SUGGESTED LEARNING EXPERIENCES

I. Student-Centered in class activity
Student should be confronted with problem of land surface usage for highways and how future demands for roads will consume productive lands.

1. The student will try to calculate area (in square miles) covered by state, county and federal roads in county.
2. Having found total area the student should try to predict needs of future (10-20-30 years).
3. An additional experience would be to estimate value of land covered by highways as to agricultural value, recreational value and forested areas.

II. Outside Resource and Community Activities

Resource and Reference Materials

Continued and Additional Sources

Publications:

Ecology and Field Biology,

Robert L. Smith, Harper and Row,
1966

Audio-Visual:

Filmstrip

Crisis of the Environment,
IV Preserve and Protect,
New York Times

Community:

County or state road maps
Measuring devices for
average width of roads
Highway Commission
Division of Highways
Dept. of Transportation

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Continued and Additional Suggested Learning Experiences

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ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p>Cognitive: Upon completion of reading <u>A Fable For Tomorrow from Silent Spring</u>, the student will discuss critically, in writing, at least one factor involved in bringing us down this path of tragedy.</p> <p>Affective: Many books have been written about man's ravaged environment. One of these, <u>Silent Spring</u>, has survived an onslaught of criticism & has taken its place as an American classic. In her book, Rachel Carson brought an end to a closed debate on pesticide practices & regulations. She had uncovered the hiding places of fact which should have long been disclosed to the public.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none"> 1. Read <u>A Fable For Tomorrow</u>, Chapter 1 of <u>Silent Spring</u>, then write a paragraph of at least one factor involved in bringing us down this path of tragedy. 2. Discuss the various factors proposed by the students of your class. 3. Read & write or orally report on <u>Since Silent Spring</u> by Frank Graham, J 4. Urge your students to observe specific problems of their immediate environment. Report in class on the particular problem & suggest various alternative ways of solving the problem.
<p><u>Skills to be Learned</u></p> <p>Examining Suggesting Discussing Propose reasons for</p>	

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Problem Orientation Pesticides Grade 10

OBJECTIVES	SUGGESTED LEARNING EXPERIENCES	
<p>Completion For nt Spring, discuss ting, at nvolved n this</p> <p>ooks have man's t. One of ig, has ght of ken its an ok, ght an bate on s & regu- ncovered of fact long been ublic.</p>	<p>I. Student-Centered in class activity</p> <p>A. Classroom</p> <ol style="list-style-type: none">1. Read <u>A Fable For Tomorrow</u>, Chapter 1 of <u>Silent Spring</u>, then write a paragraph of at least one factor involved in bringing us down this path of tragedy.2. Discuss the various factors proposed by the students of your class.3. Read & write or orally report on <u>Since Silent Spring</u> by Frank Graham, Jr.4. Urge your students to observe specific problems of their immediate environment. Report in class on the particular problem & suggest various alternative ways of solving the problem.	<p>II. Outside Resource and Community Activities</p> <p>A. Library</p> <ol style="list-style-type: none">1. Do a library research project on pesticides, use & regulation. <p>B. Community</p> <ol style="list-style-type: none">1. Discuss the pesticide regulations for your area with a Dept. Natural Resources agent, county agent, farmer, florist, etc. & report to your class.

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Continued and Additional Suggested Learning Experiences

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ESEA Title III - 59-70-0135-1 Project I-C-E

BEHAVIORAL OBJECTIVES	SUGGESTED LEARNING
<p><u>Cognitive:</u> Students will be able to describe 2 factors that significantly control life forms in major biotic regions & correlate these with the community structure of a native vegetative site.</p> <p><u>Affective:</u> Students, in report or discussions, will point out the role of man as a change agent on native biotic regions to the detriment of the native floras and faunas.</p>	<p>I. Student-Centered in class activity</p> <p>A. Unit study area: major communities, biomes, biogeography</p> <ol style="list-style-type: none"> 1. Students construct climatograms of several selected locations representing major biomes. 2. Students investigate the vegetational elements of a biome & the relationship between climate & vegetation (use film). 3. Students investigate the animal components of the selected biomes. 4. Discuss adaptations of plant & animal to a biotic region. 5. Application: By report or discussion, students connect the change in vegetation in a biotic region with man's activities, both planned and unforeseen.
<p><u>Skills to be Learned</u></p> <p>Construction of climatograms</p> <p>Correlation between environment and biota</p> <p>Correlation between flora & dependent fauna</p> <p>Observation</p> <p>Independent library research</p>	

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Problem Orientation Land Change Grade 10

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A. Unit study area: major communities, biomes, biogeography
1. Students construct climatograms of several selected locations representing major biomes.
 2. Students investigate the vegetational elements of a biome & the relationship between climate & vegetation (use film).
 3. Students investigate the animal components of the selected biomes.
 4. Discuss adaptations of plant & animal to a biotic region.
 5. Application: By report or discussion, students connect the change in vegetation in a biotic region with man's activities, both planned and unforeseen.

- II. Outside Resource and Community Activities
- A. Outside activity
1. Field trip suggested to site of relic vegetation representative of our local biome (mid-latitude deciduous forest). Contrast with vegetation in the region affected by man.
- B. Library
1. Students do outside readings on man's effects on native biomes from current periodical literature or paperbacks on environmental problems.

Resource and Reference Materials

Continued and Additional Suggested Lea

Publications:

P. Dansereau, Biogeography: An Ecological Perspective

Odum, Fundamentals of Ecology

J. H. Curtis, The modifications of mid-latitude grassland & forests by men (In) Man's Impact on Environment - Detwyler
(Copies available in CESA #9 office)

Audio-Visual:

(Student level) Who Needs a Swamp?, Gene Marine (In) America, the Raped, Avon, \$1.25.

Film:

The Temperate Deciduous Forest,
Encyclopedia Britannica Films.

Community:

Residual stands of old growth forest or reasonable facsimiles

Materials

Continued and Additional Suggested Learning Experiences

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BEHAVIORAL OBJECTIVES

SUGGESTED LEARNING EX

Cognitive: Following library research, the student will trace the fate of commercial fertilizers through an ecosystem by preparing an essay on fertilizer pathways.
Affective: Students will be able to discuss the relationship between immediate profit goals and long-term environmental damage costs.

Skills to be Learned

Ability to relate some common human activity to changes in a lake environment

I. Student-Centered in class activity

A. Students write an essay in which they follow logically the fate of commercial fertilizers used by farmers on fields. This should allow them to see that excessive use of these substances must enrich the waters of local lakes or rivers. They should consider what effect this has on plant & animal life. They should arrive at the conclusion that man can & does hasten eutrophication.

B. Students will suggest in discussion why fertilizers might be applied in rates above the capacity of soils to attempt & hold free ions from the soil solution. Teacher leads the discussion of value systems that are shortsighted and directed to immediate profit return without concern for long-term & cross boundary effects.

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Problem Orientation Fertilizers Grade 10

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SUGGESTED LEARNING EXPERIENCES

- I. Student-Centered in class activity
- A. Students write an essay in which they follow logically the fate of commercial fertilizers used by farmers on fields. This should allow them to see that excessive use of these substances must enrich the waters of local lakes or rivers. They should consider what effect this has on plant & animal life. They should arrive at the conclusion that man can & does hasten eutrophication.
- B. Students will suggest in discussion why fertilizers might be applied in rates above the capacity of soils to attempt & hold free ions from the soil solution. Teacher leads the discussion of value systems that are shortsighted and directed to immediate profit return without concern for long-term & cross boundary effects.

- II. Outside Resource and Community Activities
- A. Sample various water areas for evidence of algae growth, water clarity & microorganism density. This would indicate the presence of nutrients in varied amounts. (Do so when water temperatures is above 20°C.)

Resource and Reference Materials

Continued and Additional Sugges

Publications:

Modern Biology, Otto Towle, Ch. 49

High School Bio., p. 243, BSCS

Green Version

Audio-Visual:

Filmstrip:

N.Y. Times, 1970, Crisis of the Environment

Land Pollution #3, or Environmental
Pollution, Wards

Community: